THE FOUNDRY

Volume 53
Number 18

CLEVELAND, OHIO, SEPT. 15, 1925

Published
Semimonthly

Castings Rush Extra as the Scoop Is Scored

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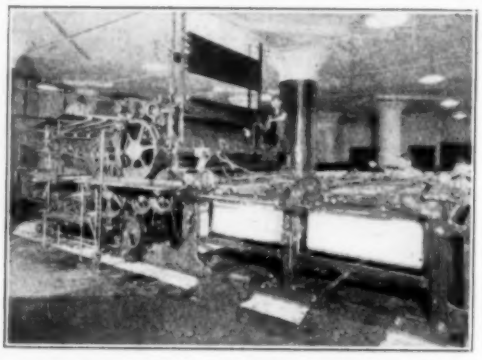

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Find Where Castings Can Be Sold

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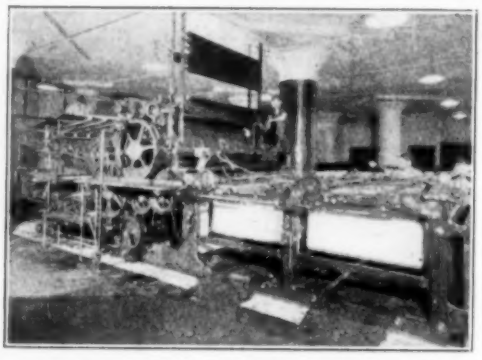

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How Can a Small Shop

Stay In Business ?

W D. STOWE, the author of this article, a native of New Haven, Conn., received his early business training on the chemical and metallurgical staff of the American Brass Co., at its plants in Connecticut and Wisconsin. In 1910 he resigned his position to enter the selling field in Chicago. Later he accepted a position as assistant treasurer of the American Safety Lamp & Mine Supply Co., Scranton, Pa.

AFTER seven years in this connection he completed a course in finance and business at the University of Pennsylvania and now is a public auditor and accountant. Contact with business in various forms has afforded Mr. Stowe an unusual opportunity to compare the methods and policies pursued by the average small foundryman, with those observed by men engaged on a similar scale with other lines of endeavor.

FROM his position as a disinterested outsider the author notes many of the fallacies that obtain among many owners of small foundries on the subject of overhead expense. Irrespective of whether it is ignored deliberately or through ignorance, it is a factor which must be taken into consideration. Usually it is the deciding element between success and failure and too often the final result is the latter.

CERTAIN problems attach to the small shop which arise out of the very fact that it is small and the proprietary interest vested in only one or two persons. Usually, by training and experience the proprietor is an expert in one branch of industry. He may be a highly skilled molder. If so, his attitude is likely to be that the one important part of his business is the production of castings in the foundry. If he buys a few machines for finishing operations, the tacit understanding is that any fellow who can run a machine, can do what little machine work is necessary. Also, this expert molder takes it for granted that he can do his own bookkeeping in his spare time and that so far as selling is concerned—well, when work in the shop gets pretty well caught up, he will leave it for a few hours and see if Tom Smith or Bill Brown of the Blank Mfg. Co. will let him make up some "more of those bushings, at the same figure."

Matters are likely to be viewed in much the same light where an expert machinist happens to start a shop of his own. However, he knows that the quality of the machine work is the important thing. He adds a little foundry to his plant, but "most any one that can pour metal, can make castings."

Mr. Small Proprietor then proceeds to establish beyond contradiction that he has been trained an expert mechanic rather than a trader or a commercial man. He says in his heart, and sometimes aloud, "I have practically no overhead at all." To him lighting, heating, insurance, taxes, power, haulage, freight, and possibly even rent and fuel are mere incidental small things for which one naturally pays when these little bills happen to come in, that's all. When Mr. Small Proprietor leaves his customary manual work in the foundry or the machine department; lets his equipment stand idle a half day or day while he does a little selling work, or attends to some extra large buying, or answers his belated correspondence, he does not associate any of that time with overhead expense. Not at all. He is merely *saving* the expense of a high priced salesman, and of an expensive clerk.

The rescue of Mr. Small Proprietor from such misconceptions as these depends of course upon his mental adaptability and capacity for business vision; and it may depend upon whether he is willing to give up some share of his proprietorship, or on his willingness to assume the responsibility of large borrowing. These latter measures would be to enable him to operate by improved, efficient, and more economic methods. Let it be remembered that when the manager-proprietor does manual work himself, he thereby employs the most costly class of labor, whether it is in the class of productive or non-productive labor, direct or indirect expense. Perhaps the only possible overhead item which a manager-proprietor eliminates by himself doing manual labor, is the item of idle time and idle time of a low priced employe can be eliminated in better way than by an employer doing the work personally which should be done by an employe.

Consider a more subtle error; an almost universal iniquity, which though not confined to the small proprietor, is to him deadly in its effects. It relates to his attitude toward competition.

The retail grocer, the retail clothier, the lawyer and the doctor appear to have learned a lesson which the local jobbing shop proprietor rarely has learned. Both the retail merchant and the jobbing shop proprietor have this common to their industries—that each may start business with a relatively small capital. Therein lies partly the explanation for the strength in numbers and general weakness in stamina of jobbing shops.

It is instructive to inquire how the retail merchant has answered the challenge to his business acumen pre-

sented by the fact that a hundred of a kind may exist in the same city or the same county. They prosper side by side, and the proprietors maintain a decent standard of living.

Materials And Service

The underlying reason is that generally the retailer is a commercially trained man rather than a man trained as an artisan. The merchant has learned that he *does not sell prices*. The merchant really may have a leader which he sells without a margin to cover either indirect expenses or any profit; but it will be only a lead. The mass of the merchant's sales are made at a real margin over material cost, and that margin is sufficient to provide for indirect or overhead expenses, and also usually a profit. When that ceases to be the general rule, the retail merchant as well as the small foundryman is pulling down the fabric which supports him. He is taking a step in the direction of deteriorating equipment, antiquated stock in trade, stagnation rather than advance in business standards and conceptions, impaired credit—in a word, a step toward insolvency.

Prices are what customers pay. The things that are sold are materials and services. A customer may pay in one of the chain grocery stores a less price than he would pay for the same material in a small individually owned store. When that condition exists, the customer foregoes certain service which he would pay for if he bought at the individually owned store. It may be that the individually owned store is extending credit, or is making delivery by truck, or is keeping open long hours, or is giving a personal service, perhaps by the proprietor himself, which the customer is willing to pay for beyond what he would pay for the same material at the chain store. Thus while the chain store sells larger volumes at lower prices per unit of material, it sells by system, by what is more or less bulk and volume methods. The successful individual proprietor alongside it or in the next block sells the same material plus something else in the nature of a service, for which the customer willingly pays a higher total price.

The successful small individual merchant does not say in effect, even when business is a little dull, "Please, mister customer, if you will only buy from me I will give you the same price that the chain store grants, and I will also include the old credit, locate in the same convenient place for you, keep open till 9 o'clock every night, and still give you the chain store prices for the total."

In contrast to this, what is the attitude of the small foundryman, who has been thinking all his life, heretofore, of the art and science of the constructive measures of industry, rather than of commerce as relating to the exchange of goods and services? First, he decided to set up in business for himself. He goes to a few of his trade acquaintances and says. "You've been paying Thus & Co., 25 cents per pound for No. *A* castings. Let me have the business at the same price, as a friend." He goes to others, not of his special acquaintance and says, "You've been paying So & Co., 25 cents per pound for No. *A* castings; I'll make them for 24 cents." Our new foundryman gets both orders. In due time So & Co. and Thus & Co., with equal folly, go to their former customers and say "We'll make those No. *A* castings for you the same as we used to make them, but for 23 cents per pound." So & Co. and Thus & Co. get the business back again.

A trade depression occurs and every proprietor is more hungry than ever for business. The smart purchasing agent for Mr. Customer sends out inquiries to a long list of vendors, requesting prices on more No. *A* castings. So & Co. and Thus & Co. sense what is in the air, and straining to retain their old time business they quote 20 cents per pound for No. *A* castings, well knowing that material and direct labor cost 18 cents and that overhead costs them 5 cents and a reasonable profit should bring them 2 cents more, or a total of 25 cents.

Then our New Foundryman rises up, primed at heart with his big idea. He smugly says "I don't have any overhead—anyhow not so much! So & Co. and Thus & Co. have to hire bookkeepers, stenographers, even foremen! They have a big overhead. I'll go out and get that casting business at 19 cents per pound. I need it."

He Loses Out

Mr. New Foundryman get the big order. He proceeds immediately with the work in his shop, doing as much upon it personally as he can to keep down the cost and also does all he can of the overhead work of his shop as usual. Thus instead of doing the real work of ownership and management, conceiving plans for future business, cultivating new trade relations, devising new production methods, preparing for changes in business conditions which must take place month by month, all of which should produce salary or profits for Mr. New Foundryman of $10,000 per year; he instead reduces himself to what to him is the drudgery of bookkeeping and letter writing which a properly trained clerk would do with many other things cheerfully at $1800 per year. Of course, Mr Foundryman does enough molding to cover what a good molder would do for $2500 per year. In the end he foregoes all business profits that year and also takes a net of $500 on his investment.

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In the writer's observation, the effect of all this selling of prices is about as follows: Mr. New Proprietor struggles along; So & Co., while a little bigger and better established, only struggle along, and Thus & Co. struggle along. Mr. Customer's purchasing agent has been brought to think, by all this lowering of prices with each successive depression, that all these foundrymen were formerly rather in the class with which we associate holdup men and bandits. Mr. Customer doesn't seem to be getting deliveries as promptly as in the former times; the goods he buys show no progress in the local foundry industry. These foundrymen usually seem to be caught without any material on hand when an order is given them. Mr. Customer thinks he gets 88-10 and 2 when he orders it. No, he hasn't had the castings analyzed. Sometimes a foundry will run a little off mixture; and under some circumstances only little more than a guess can be made as to the real composition of the castings made.

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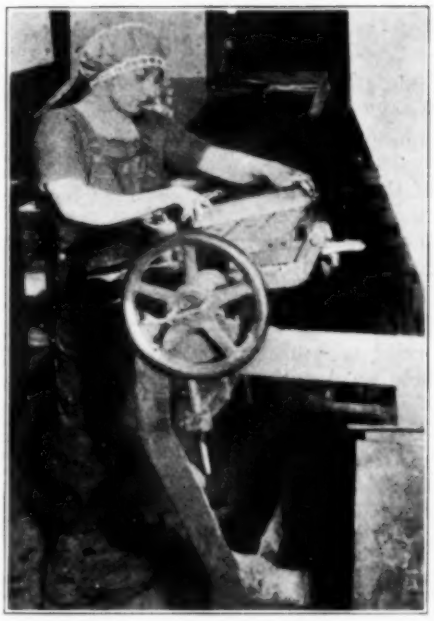

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For the benefit of any who may not have seen the plan of the group of buildings of the Cadillac Motor Car Co., Detroit, shown in the Aug. 1 issue of THE FOUNDRY it may be interesting to explain that the coreroom and the brass foundry are housed in a building located between the iron foundry on the north and the aluminum foundry on the south. A paved court 28 feet wide separates the buildings on either side. The coreroom part of the building adjoins the sand storage building on the west and is separated on the east from the brass foundry by a general foundry store room containing tools and supplies. The entire building is 120 feet wide by 420 in length and of this length the coreroom occupies 260 feet.

Cores are made in that part of the coreroom adjoining the sand storage, they are dried in the center section and are assembled and stored in a third section located approximately opposite the center of the iron foundry on one side and the aluminum foundry on the other side. Access is had to the brass foundry through a passage in the center of the store room. From the foregoing it may be noted that the movement of material is steadily forward from the sand storage building to the molding floor. The same feature has been worked out carefully and applied to all departments.

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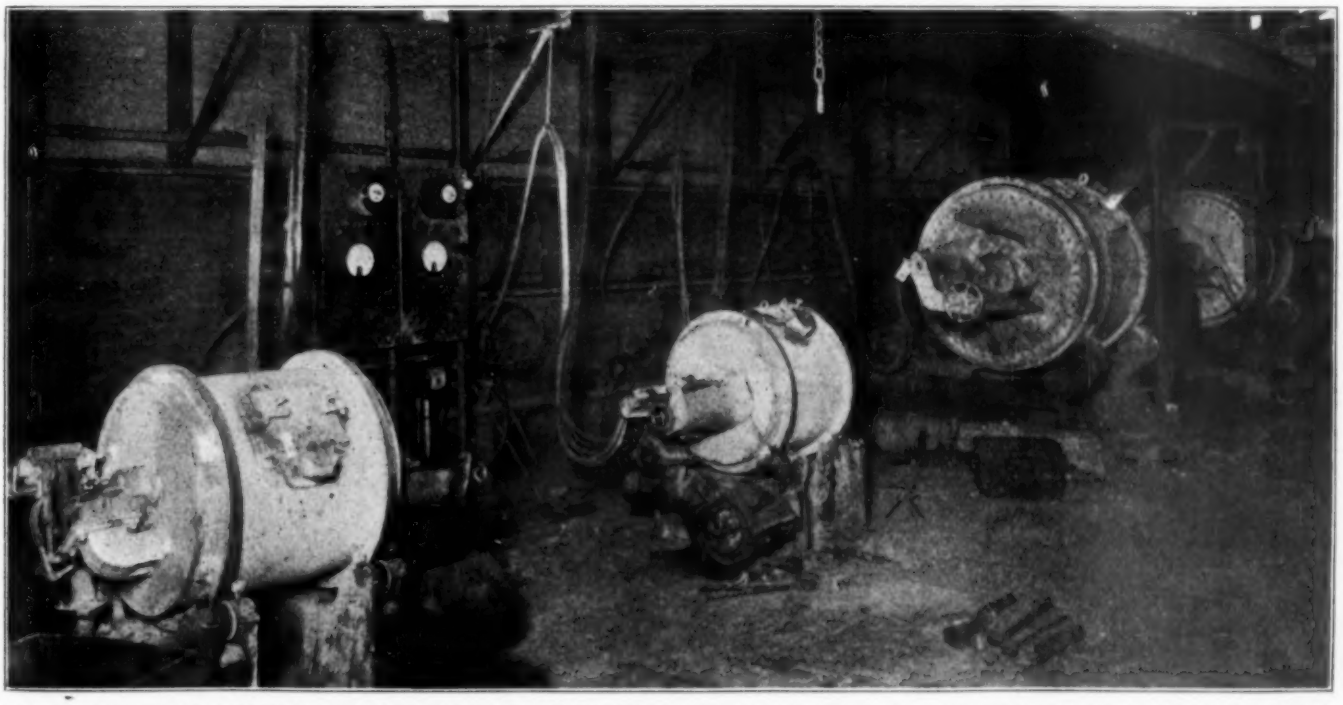

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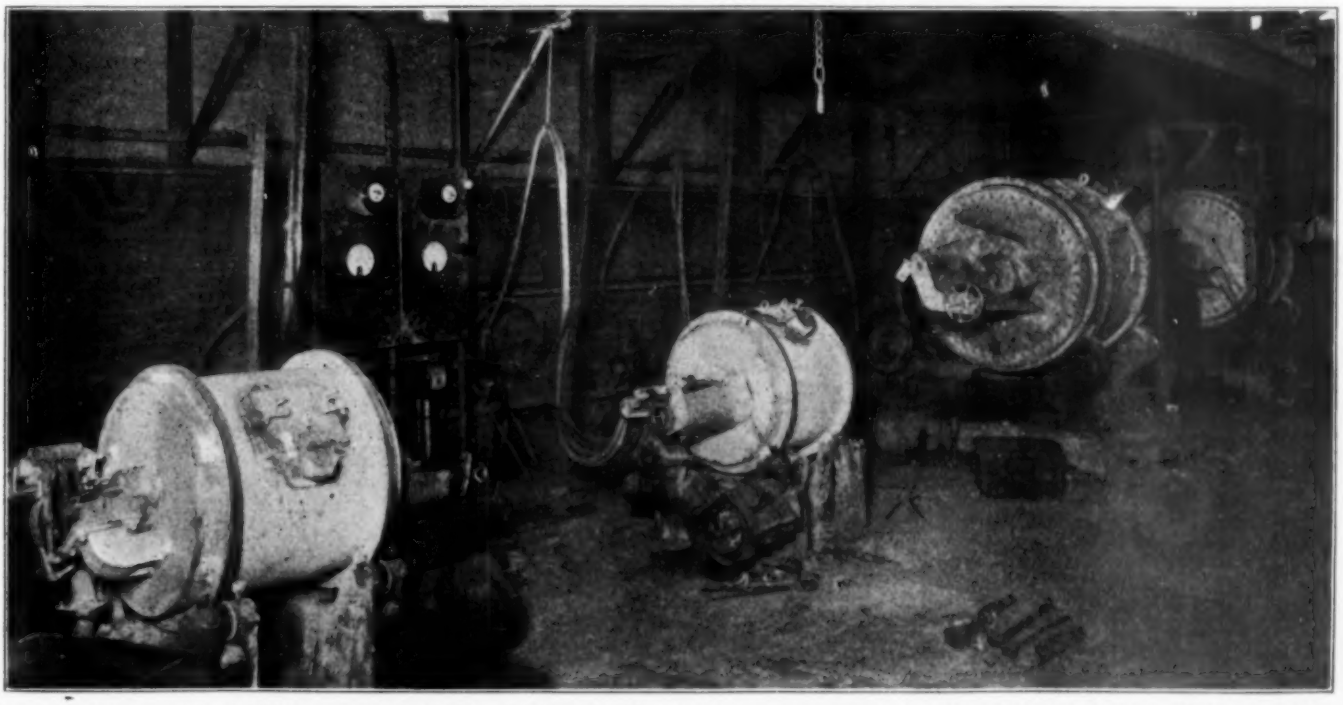

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FIG. 4—CORES FOR THE CYLINDER MOLDS ARE ASSEMBLED ON JIGS AND AFTERWARD DRIED AS UNITS BEFORE THEY ARE PLACED IN THE MOLDS

and anchor bolts are down for a second pair of mixing machines to be held as spare under normal conditions and if necessary may be brought into service during periods of peak production.

Prevents Errors

Manifestly where large numbers of duplicate cores are required continuously, it is essential that the various cores and mixtures should be held to a steadily uniform standard. An extended series of experiments was conducted to determine the mixture most suitable for each class of cores and when this point was settled every effort was made to insure a constant supply of the same material. With the exception of general supervision and occasional adjustment, the human element is not involved in the mixing operation. The correct proportions of sand and oil are measured automatically instead of being left to the sometimes erratic guessing of the ordinary foundry helper to whom an error in the mixture is the least of worries. He always is ready with an affidavit that he followed instructions scrupulously and where can proof be had to convict him? The foundryman may have a reasonable suspicion, but with so many other factors that may be responsible in part or in whole for lost castings, suspicion is not proof.

This condition is not present in the Cadillac foundry. Once a mixture has been developed it is duplicated in every essential day after day. A pan under the sand supply hopper measures a definite supply of sand and discharges it into the mixer underneath. The slide under the pan is operated by a horizontal air hoist controlled by a lever within reach of the attendant on the floor.

Core oil is stored in two 10,000-gallon tanks located under ground close to the termination of one of the railroad tracks in the angle formed by the end of the aluminum foundry with the side wall of the long building housing the sand shed, coreroom and brass foundry. It is pumped from the tanks to a measuring device located close to the mixers. From the measuring device it is sprayed over the sand in the mixing trough by a compressed air jet. A sufficient amount of water to render the sand workable is sprayed on at the same time and in the same manner.

The core sand mixture is subjected to the beat of the revolving paddles in the mixing trough until the bond has been distributed thoroughly. The maximum time required for this process has been determined and the mixer is allowed to run for that length of time and no longer. At the expiration of the set period, the prepared sand is dumped into a horizontal chute from which a spiral conveyor feeds it into a bucket elevator. The elevator discharges it into any one of a series of storage hoppers where it is held until required.

Use Monorail Carriers

A monorail system with suspended bottom discharge buckets installed by the Cleveland Crane & Engineering Co., Wickliffe, O., is employed to distribute the sand to the various coremaking stations. This is part of the same system used in all the foundries in the group and described in the Aug. 1 issue of THE FOUNDRY. The carrying unit comprises two buckets with a control station between them for the driver.

Sand hoppers in the coreroom are arranged in two double and two single rows with 16 hoppers to a row. The double rows flare at the bottom to serve two rows of benches, but they terminate at a common opening at the top where they are filled from the monorail buckets. Approximately half the capacity of the coreroom is devoted to the production of cores for the iron foundry. Cores for the aluminum foundry engage about ⅜ of the floor and oven space and the remainder of the space is utilized in making cores for the brass foundry, the smallest unit of the three parts.

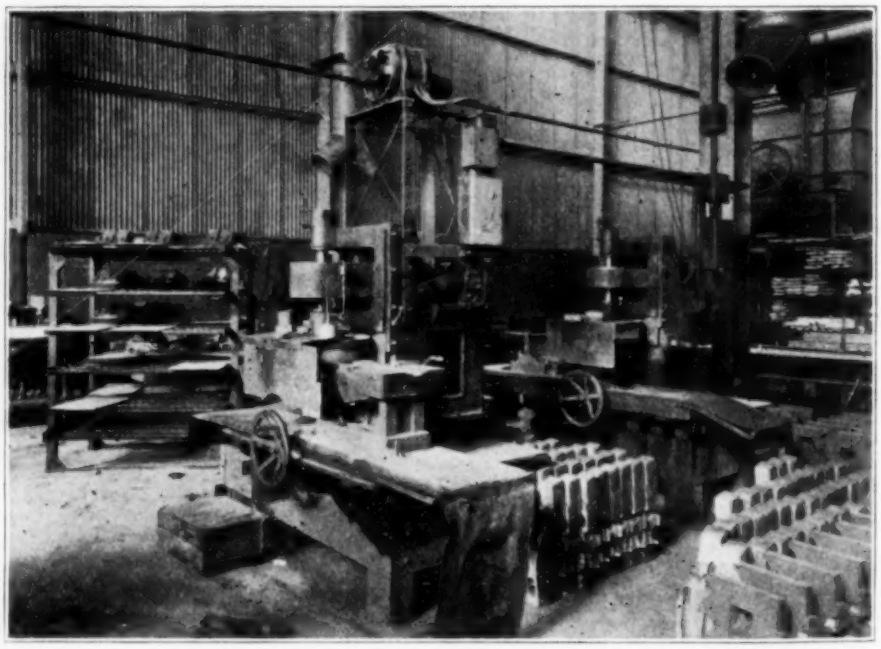


FIG. 5—HALF CORES ARE SURFACED ACCURATELY TO SIZE AND SHAPE ON THE JOINT SIDE

Many cores are dried in special shells which retain the shape in the body of sand until it has stiffened sufficiently to hold itself. Others are dried on flat plates in the usual manner. They are loaded on racks deposited at convenient points near the benches. The loaded racks are conveyed into and out of the ovens on lift trucks.

Extensive Core Ovens

Green cores are dried in horizontal rack and drawer type ovens, while cores that require a supplementary heating to dry paste or core wash, are dried in five revolving vertical type shelf ovens made by the Detroit Sheet Metal Works Co., Detroit. The rack and drawer type ovens were installed by the Foundry Equipment Co., Cleveland, and include 28 of the first type and three of the second arranged for convenience in one single and two double batteries with six ovens in a row on each side. Each of the rack type ovens is 6 feet wide, 7 feet high and 13 feet in length with a holding capacity of two portable racks each 5 feet wide, 5 feet long and 6 feet high. Each of the drawer ovens is equipped with six drawers each 4 feet wide and 8 feet long.

Small cores and delicate cores subject to easy breakage or distortion are baked in the rolling drawer ovens. These ovens also are used for rush work. A few cores readily may be placed in a drawer and dried without having to wait for the entire contents of the oven to dry as in the case of one of the large ovens.

Ovens are fired individually with fuel oil pumped through mains suspended in a series of connected tunnels and supplied from three 20,000-gallon tanks buried in the yard on the south side of the aluminum foundry. It is claimed that the individual control provides a flexibility of operation not obtainable where several ovens are fired from a single firing chamber. Varying temperatures to suit different classes of cores are maintained easily where individual control is provided for each firebox. Also at slack periods when all the ovens are not filled, a considerable saving in fuel may be effected by only burning oil in the ovens that are loaded.

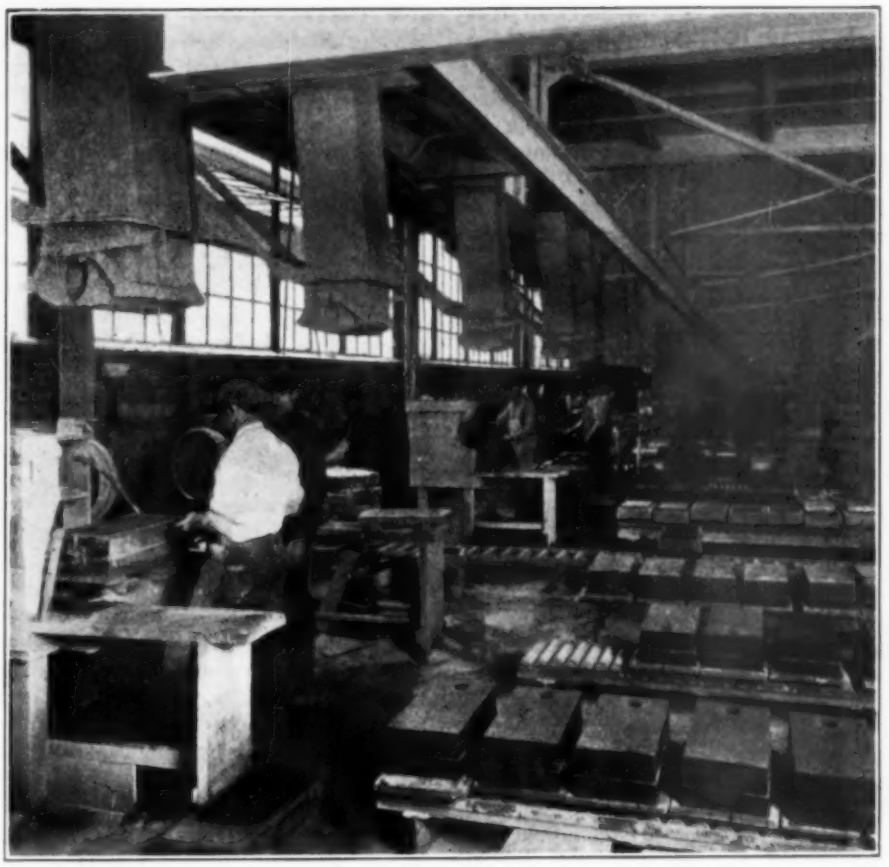


FIG. 7—ONE OF THE FOUR MOLDING SECTIONS OF THE BRASS FOUNDRY. SAND IS DELIVERED BY THE OVERHEAD HOPPERS AND THE MOLDS ARE POURED ON THE GANGWAY END OF THE ROLLER CONVEYORS

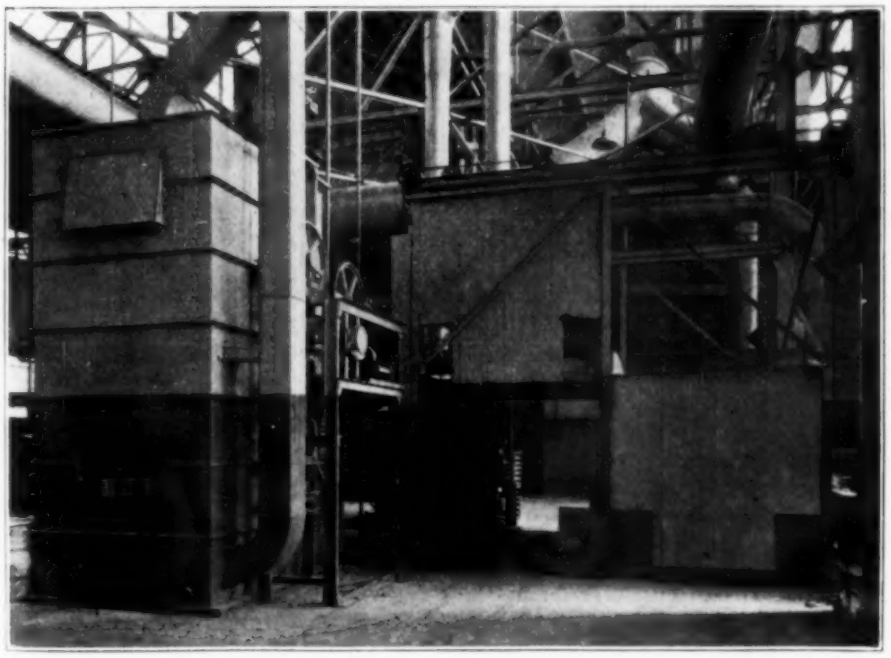


FIG. 6—PART OF THE GAS AND ELECTRICALLY HEATED OVEN EQUIPMENT WHERE THE CORES ARE GIVEN A SUPPLEMENTARY HEATING

Oil at 15 pounds and air at 1½ pounds per square inch pressure are forced through the low pressure type oil burners also made by the Foundry Equipment Co., Cleveland. The air pressure is supplied by two turbo-compressors made by the Spencer Turbine Co., Hartford, Conn.

Natural Draft Used

Ovens are fired from underneath with the burners easily accessible in a spacious tunnel extending under the floor to all necessary points and with entrances inside and outside the building to furnish a circulation of air. The firebox or combustion chamber under the end of each oven is connected with a main flue under the oven floor in which the intense heat from the oil flame is reduced with auxiliary air so that the hot gas is diffused and moderated before it is admitted to the oven chamber.

Natural draft is utilized throughout for circulation control, ventilation and the necessary supply of auxiliary air.

Moisture, gases and products of combustion are removed through adjustable valves attached to flues built in the oven walls.

Wires and rods for reinforcing the cores are prepared in a special room 28 x 60 feet set apart and equipped for the purpose. It is a continuation of the court which separates the coreroom and brass foundry from the iron foundry building. The west end is bounded by the iron foundry facing sand department in the sand storage building; the east end is separated from the open court by a brick wall. The room has been roofed over and in effect is an overflow department of the coreroom. New wire and old wire which has been reclaimed are bent to the required shape and size in a number of machines ranged along one side near the wall. Other shapes are bent by hand on a long bench provided with suitable forms and located on the opposite side of the room.

Reinforcing rods are held to a minimum in cores used in automobile castings. Partly on account of the time involved in putting them in and getting them out, but principally because experience has shown that an extremely limited number is sufficient. The mixture of sharp sand and oil makes a hard, firm core, well able to hold its shape until the comparatively thin section of metal has solidified. The only exception to the general rule is the barrel core which is made on a cast-iron arbor. However, the arbor fulfills many functions besides that of reinforcing the sand. It is 1½ inches in diameter and thus reduces the amount of sand required to an appreciable degree. It insures a thoroughly dried and well vented core and one that is dried in less time and with a smaller expenditure of fuel than one made entirely from sand. The arbor may be used repeatedly and requires neither upkeep nor repair expense. It is knocked out of the casting shortly after the casting is poured and is ready for use again in the coreroom shortly afterward. Also it is claimed that the circulation of air through the hollow core promotes a more uniform cooling speed in the casting than where a solid core is employed.

Fitted In Jigs

Cores are held to the closest workable limits and are carefully fitted by gage and templet before and after they are placed in the mold. Crankcase cores, transmission housing cores and others made in halves and designed to be matched either with green or dry sand halves are placed in suitable jigs and passed under the surfacing machines shown in Fig. 5, where any irregularities are removed and the total thickness of the core is reduced to the proper point.

With the exception of the barrel cores and a few other small cores, the entire set of cores for a cylinder is assembled on a jig plate and pasted together as a unit before it is placed on the mold. This department is shown in Fig. 4 where the operators assemble the cores on the bench at the right and then place the assembly on the roller conveyor on the left. When each core assembly arrives at the end of the conveyor it is taken to a second conveyor which passes through an oven where the paste and corewash are dried and the collection of cores comes forth welded into a firm unit.

Strainer cores and pouring basin cores are made on the type of machine shown in Figs. 1 and 2. It is provided with a quick acting clamping device, guides for drawing the corebox accurately, and a hand wheel for turning it easily and rapidly. The plate is jolted by hand. This same type machine is utilized for the production of many small cores.

Finishing Department

Both male and female operators are employed in the coremaking department, but the routine performance is laid out in such a manner that the sexes are segregated and each group enjoys what amounts to practically complete autonomy. Girls are employed on the side where the cores are made and also in the division of the coreroom between the ovens and the brass foundry where the cores are given the final touch before they are taken to the various molding departments.

When the loaded racks are removed from the ovens they are taken into this department. Cores that require no further handling are left on the racks to cool and later are taken direct to any designated point in any of the three foundries. All other cores are taken from the racks and after any necessary adjustments have been made, they are placed on shelves for the benefit of the assemblers as illustrated in Fig. 4, or are placed on other racks in readiness for the trucks that eventually take them to the molding shops. The empty racks are returned to the vicinity of the various core making stations, there to be reloaded and again placed in the ovens.

The brass foundry occupies a space 120 x 120 feet with a cleaning department all the way across the outside or east end, a melting room enclosed by a curtain wall in the center and the remainder of the space laid out in four molding floor units. One of the side units is shown in Fig. 7 and part of the equipment in the melting department is shown in Fig. 3. A basement under the cleaning room and the loading dock immediately adjoining on the outside of the building is utilized as a store room for the stock of nonferrous metal. Trucks back up to the windows under the loading dock and discharge the metal through suitable chutes. An elevator located near one corner of the basement serves to take the metal up to the melting room as it is required. The basement is connected with the tunnel system, and also may be entered from a stairway close to the elevator.

Roller Conveyors

With one or two slight exceptions the equipment and routine in the brass foundry are similar to that in the aluminum foundry described in the Sept. 1 issue of THE FOUNDRY. Molds are placed on roller conveyors extending from the various molding stations, machine or bench, to the gangway. Each succeeding mold pushes the preceding mold closer to the end. Accordingly as the molds arrive at or near the end of the conveyor they are poured and almost immediately shaken out. The castings are removed to the cleaning room and the sand falls through a grating upon a belt below the floor. The various belts convey the sand to a station where it is reconditioned for use.

Sand in the brass foundry is not required in anything like the volume necessary either in the aluminum foundry, the coreroom or the iron foundry. Therefore it has not been considered expedient to install a mechanical system of distribution. The sand is taken in wheelbarrows from the storage tanks and conveyed on suitable overhead runways to the openings of the hoppers that serve the molding stations.

In addition to many benches where the molds are rammed by hand on matchplates, the shop is equipped with 18 molding machines made by the Arcade Manufacturing Co., Freeport, Ill., Berkshire Manufacturing Co., Cleveland and the Johnson & Jennings Co., Cleveland.

The melting room is equipped with both oil and electric melting furnaces. The electric furnaces include two 750-pound capacity and three with a capacity of 200 pounds made by the Detroit Electric Furnace Co., Detroit. Current for operating the furnaces is supplied by the Detroit-Edison Co. An additional small electric

(*Concluded on Page* 728)

Construct Manganese Shop in the West

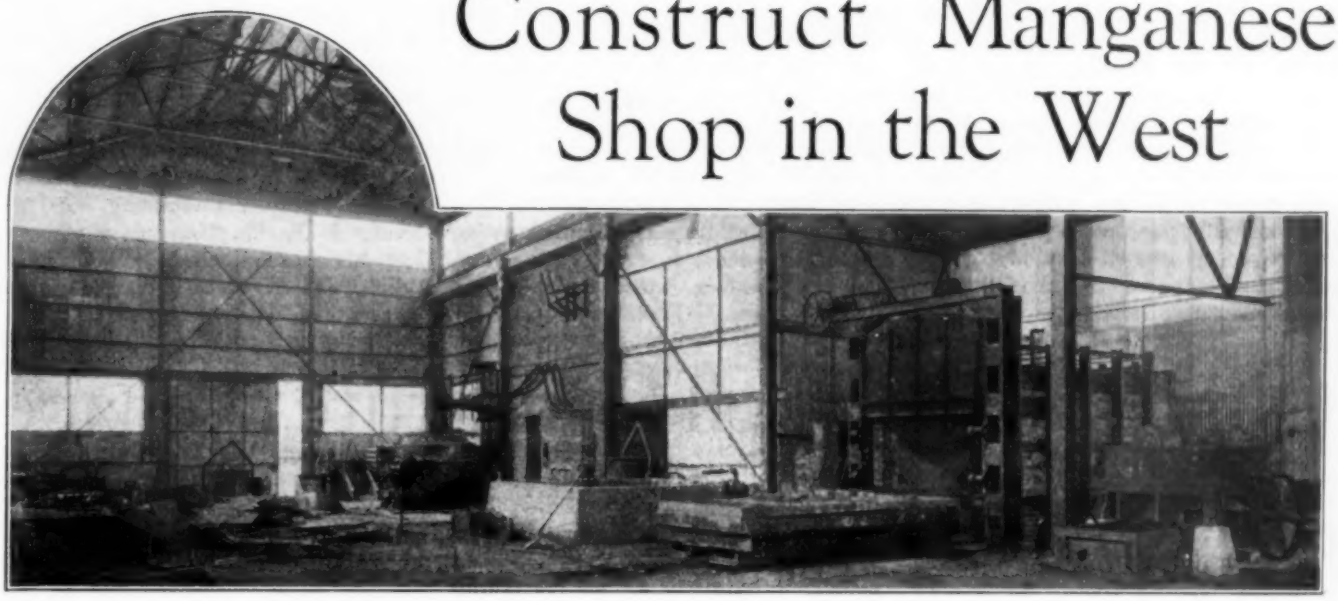


Fig. 1—The Melting and Heat Treating Equipment Is Concentrated at One End of the Foundry and Is Served by the Main Bay Cranes

DURING the past four or five years the attention of many large eastern manufacturing concerns has been focused on the rapid industrial development along the Pacific Coast, especially in Los Angeles and Southern California. Each year more and more eastern companies have established branch manufacturing and assembling plants on the Coast and have increased their sales and distribution organizations, realizing that the territory offers them new and wider markets.

One of the newest industrial additions to Los Angeles is the modern manganese steel castings plant, the only one in the southern part of the state, recently installed by the American Manganese Steel Co., Chicago. The main building 100 x 200 feet, is a steel frame structure, designed, fabricated and erected by the Union Iron Works, Los Angeles. Corrugated galvanized sheets form the roof and side walls. Ample light is provided by two wide rows of side windows which run the entire length of each side of the building. This building is divided into three bays, the center one being 40 x 200 feet and the two side bays each 30 x 200 feet.

The main bay contains a 38-foot span 5-ton electric overhead traveling crane built by the Harnischfeger Corp., Milwaukee, while side bays are equipped with an overhead monorail system on which one-half ton trolleys are used. A series of I-beam runways, three between each upright, have been installed across each side bay, the ends extending into the main bay, thus permitting loads from the 5-ton crane to be picked up quickly and easily.

A 2-ton electric furnace built by the Pittsburgh Electric Furnace Co., Pittsburgh, is installed at one end of the main bay and here the steel is melted and the molds poured. An 8 x 12-foot car type, top oil-fired furnace for heat treating the castings is located near the melting furnace.

The shake-out floor adjoins the melting and heat treating departments, thus eliminating excessive hauling of castings from the shake-

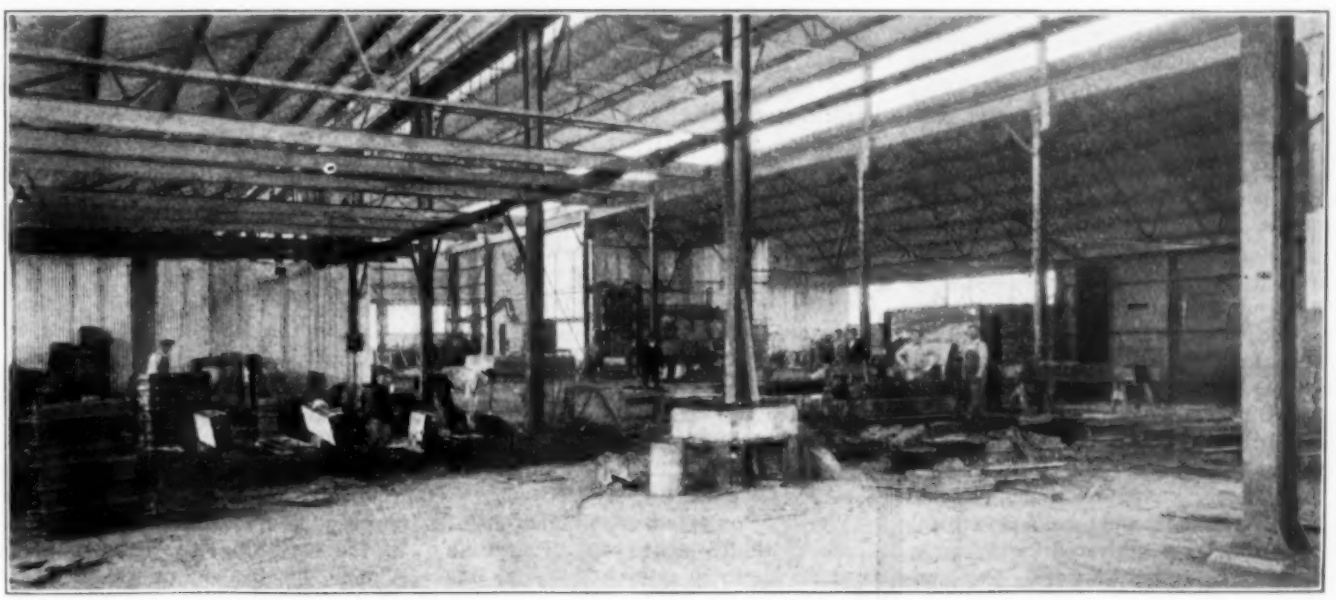


FIG. 2—THIS BAY IS DEVOTED TO SNAP-FLASK WORK. AT THE EXTREME RIGHT MAY BE SEEN THE MOLD DRYING CORE OVENS LOCATED IN THE OPPOSITE BAY. IN THE CENTER BACKGROUND ARE SHOWN AN ELECTRIC MELTING FURNACE AND ANNEALING FURNACE

out floor to the heat treating furnace. The sand goes back down to the foundry and the castings directly across to the finishing department, thus preventing the necessity of any back haul on heads and gates which are remelted, and providing for but a short move of the refuse sand. Two drying ovens for molds, 10 x 16 feet, and six core ovens 5 feet wide, 10 feet deep and 7 feet high, have been installed near the heat treating furnace. These ovens are served by a lift truck. All heating is done by oil, each furnace being equipped with individual blower unit for air supply. The snap-flask molding department is directly opposite the drying department. Part of one side bay has been housed off and is completely equipped for pattern making.

Included among the equipment is a 400-ton hydraulic straightening press, three jolt and squeeze molding machines, two 5 x 6-foot table jolters, a sand mixer, three hand roll-over machines, a heavy-duty electric welder and a 500-cubic foot air compressor. Swing grinding machines of the company's own design are used for cleaning and grinding castings.

Offices of the company are in a separate building, 30 x 50 feet, located nearby. Metal sash is installed on all sides of this building. D. H. Young is Pacific Coast manager and has his headquarters in Oakland, Calif. H. A. McPherson is plant superintendent.

Old Shot and Shell Constitute Menace

By Robert E. Masters

GENERAL EMORY UPTON for whom Camp Upton was named, author of *Upton's Tactics*, commander of West Point military academy from 1870 to 1875, was detailed April 16, 1865 to destroy the plant of the Columbus Iron Works, Columbus, Ga. This was one week after the date of General Lee's surrender April 9, 1865, but methods of communication and transportation were not so rapid then as they are at present. This introductory paragraph is presented not for its historical value or because the reader may not be familiar with the dates set forth, but merely as another confirmation of the standard conversational nugget: "Well, the world is only a small place after all."

While in charge of the foundry of the Columbus Iron Works I made my home with the sister of the late Riley Brown, president and founder of the plant and, therefore, was in a position to hear all the details of the thorough manner in which General Upton's men did their work. They burned the buildings, smashed the engines, machinery, and pulleys; they even heated the shafting and tied knots in it. When I assumed charge several years later I found the engine bed employed in the foundry, patched in several places with wrought iron bars. Now for the coincidence. Recently when I wanted to check up on the dates and other details in connection with the episode I secured them in this California town from my next door neighbor who is General Upton's sister and who presided over his house when he was at West Point.

For many years after the close of the Civil war cannon balls and bomb shells regularly appeared in the scrap secured from junk dealers. The cannon balls, of course, were harmless but the bomb shells which had failed to explode were a constant source of extreme danger. Almost without exception they were so rusted, they could not be distinguished from ordinary shot.

On one occasion in spite of all our care one of these shells was charged in the cupola and naturally when it became heated sufficiently it exploded and wrecked the cupola. At about the same time two boys about 12 years old who had been accustomed to bringing their father's lunch to the shop, found one of these shells and carried it out behind the core ovens with the object of picking the powder out of it. We discovered later that they had been indulging in the practice for some time and that accounts for the fact that they probably had become careless. In this particular instance the shell exploded and killed the two boys.

After the fatal accident I had all the scrap that resembled either a shot or shell dumped in an abandoned well near the gate back of the foundry on the road above the Chattahoochee river. The accumulated material filled the well almost to the top. A covering of sand and cinder leveled the place and I often have wondered since what theory will be advanced by the ultimate discoverer of this mass of cast iron war relics.

Illustrating the extent to which this war material figured in southern foundry scrap as late as 1886, I experienced no difficulty in meeting the request of Horace Cory, Middletown, N. Y., in supplying enough shot and shell from the scrap pile of the Tredegar Works, Richmond, Va., to build a pyramid in Middletown during a G. A. R. reunion.

We had quite an accumulation of these castings, picked out from time to time and in spite of all our efforts, it seemed impossible to keep scrap of this character off the market. At one time I had the entire pile taken out and dumped in 12 feet of water in the James river. From the window of my office, built on iron columns out over the river, I had a full view of the dumping area and was surprised a few days after to see several heads bobbing on the surface in that vicinity. It seems almost incredible but by watching for a short time I discovered that these young fellows who under ordinary circumstances could not be persuaded to do a day's work, actually were salvaging these lumps of iron, 12 inches or more in diameter, by repeatedly diving and rolling a ball a short distance toward the shore each time. Such an example of persistence and grit prevented me from interfering and eventually every one of the balls was rolled out on the bank and from there it was no trouble to get them back into the hands of the junk man.

Seek To Avoid Cupola Explosions

Safe preparation of scrap cast iron cylinders and pistons to avoid the possibility of explosions in cupolas will be discussed by the scrap committee of the American Railway association. The danger from water getting into cupolas by this route was mentioned at a recent meeting of the Chicago Foundrymen's club following an address on scrap by Frank Parker, of Briggs & Turivas, Chicago. The matter was laid by Mr. Parker before C. H. Hoinville, of the Santa Fe railroad and a member of the railway association's scrap committee. According to Mr. Hoinville, it has been the practice of the Santa Fe "to knock out the soft plug, particularly in the cylinder heads, as we have known of this danger of explosion in the cupola and have guarded against it in that manner."

A.F.A. Announces Medal Award

Richard Moldenke To Receive Seaman Medal and Robert J. Anderson To Be Presented with MacFadden Medal at Syracuse Convention

ON THE recommendation of the board of awards, the board of directors of the American Foundrymen's association has chosen Dr. Richard Moldenke to be the first recipient of the Joseph S. Seaman gold medal, one of the association's four major awards, in recognition of his many contributions to the foundry industry. Dr. Robert J. Anderson at the same time was chosen to receive the first W. H. MacFadden, gold medal for his contributions to the technical sessions of the American Foundrymen's association and his contributions to the aluminum casting industry. These medals, which are to be presented at the Syracuse meeting of the American Foundrymen's association, Oct. 5 to 9, are two of four gold medals which the association has authorized for presentation from time to time to outstanding men connected with the foundry industry. The first Penton and Whiting medals were presented at the 1924 Milwaukee meeting to Enrique Touceda and John Howe Hall for their contributions to the malleable and steel castings industries respectively.

These medal awards were made possible by gifts to the association of $5000 each by four charter members and past officers of the association, John A. Penton, W. H. MacFadden, J. H. Whiting, and the late Joseph S. Seaman.

Dr. Moldenke To Receive Seaman Medal

DR. RICHARD MOLDENKE will receive the first Joseph S. Seaman gold medal, presented in recognition of his many contributions to the foundry industry.

To the older foundrymen of the country this further recognition of the work and influence of Dr. Moldenke will be found particularly fitting, for

RICHARD MOLDENKE

his services in the formative period of the American Foundrymen's association could receive no greater reward. By strange coincidence, the work of Dr. Moldenke for the association has been identified closely with the life and service of "Daddy" Seaman, to whom the former often refers as his friend and mentor of early days. Another point of interest is the fact that at the Chicago convention in July, 1900, when Dr. Moldenke was elected secretary-treasurer of the association, succeeding John A. Penton, the first secretary, Joseph S. Seaman was serving as the third president of that rapidly growing organization. The service of Dr. Moldenke from that time until his resignation in 1914, while primarily given to the American Foundrymen's association, found application throughout the foundry world and doubtless constitutes his greatest service to his industry.

Born at Watertown, Wis., Nov. 1, 1864, the son of a Lutheran minister, Dr. Moldenke removed to New York in early life and received his early education in that city. He was graduated from the school of mines of Columbia university with the degree of engineer of mines in 1884. After two years of varied engineering experience, he returned to that university to act as instructor and to qualify for the degree of doctor of philosophy which was awarded him in 1887. Following this he was active in the coast and geodetic survey for the government and was identified with some of the early work in electric power development. In 1889, he organized the mechanical and electrical engineering department of the Michigan College of Mines, Houghton, Mich.

About this time he was offered a position with McConway & Torley Co., Pittsburgh, which proved to be the starting point of his career as a metallurgist. His experience, coupled with the opportunity for original research gave to him a general knowledge. He worked out the action of carbon, silicon and other basic elements in iron, became familiar with malleable iron, at that period a little known metal,

(*Concluded on Page* 734)

Dr. Anderson Is Awarded MacFadden Medal

DR. ROBERT J. ANDERSON will be the recipient of the W. H. MacFadden gold medal of the American Foundrymen's association, which will be presented at the Syracuse meeting to be held in October. Dr. Anderson was considered by the committee for this award because of his scientific contributions to the aluminum

ROBERT J. ANDERSON

casting industry and for his committee activities and technical paper contributions at the meetings of the American Foundrymen's association.

Born in Cleveland, July 10, 1892 he obtained his earlier technical training at the Case School of Applied Science, Cleveland, from which school he received the degree of bachelor of science in metallurgy in 1914 and post-

graduate degree of metallurgical engineer in 1917. In 1925, he was granted the degree of doctor of science from the Massachusetts Institute of Technology, Cambridge, Mass.

Upon graduation from the Case School of Applied Science, he accepted a position as instructor in metallurgy at the Missouri school of mines, Rolla, Mo. The later positions held by Mr. Anderson were successively those of metallurgical engineer for the American Rolling Mill Co., Middletown, O.; assistant to Dr. Henry M. Howe, Columbia university, New York; chief metallurgist, Cleveland Metal Products Co., Cleveland; research metallurgist, bureau of aircraft production, Washington, Pittsburgh and Detroit; metallurgical engineer and chief of the nonferrous metals section of the bureau of mines, Pittsburgh; and lecturer in metallography, Carnegie Institute of Technology. At the present time, he is acting as consulting metallurgical engineer and technical expert in the metallurgy of aluminum with headquarters in Cleveland and Pittsburgh.

Dr. Anderson has contributed extensively to the technical magazines and technical associations with articles on metallurgical subjects chiefly relating to aluminum and aluminum alloys. Among his activities in behalf of the American Foundrymen's association is the development of the aluminum-alloys session of the annual technical meeting. Following the holding of the first aluminum-alloys session at the Rochester convention in 1922, these sessions have become an important part of the annual technical program.

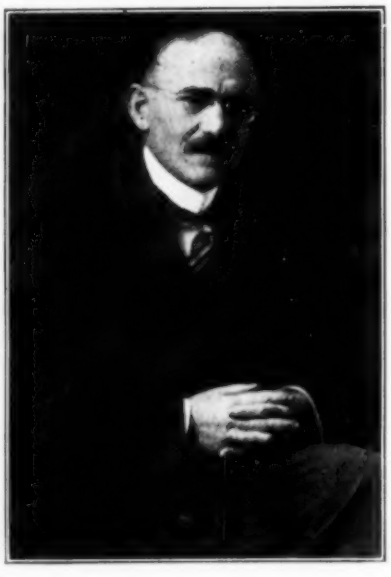
He has carried out many investigations on various aspects of aluminum-alloy foundry practice. Certain of the more important of these investigations include those on scrap losses and wastes in aluminum-alloy founding, on specific defects such as blowholes and porosity, inclusions and cracks, and on melting losses and furnace practice. The result of the majority of these investigations has been published in the *Proceedings* of the American Foundrymen's association and in government technical papers. He also has carried out investigations and published his findings on the heat treatment of aluminum-alloy castings and on radiography applied to such castings. He has published results of investigations on the metallography, heat treatment and founding of brass, bronze and other copper alloys, together with investigations on the corrosion of metals and alloys. In this connection he developed the accelerated electrolytic corrosion test.

His recent book "The Metallurgy of Aluminum and Aluminum-Alloys," has received an excellent reception as a standard text and reference book in its field.

His contributions to the meetings of the American Foundrymen's association have been numerous and in addition he has served on several technical committees being for several years chairman of the committee on nonferrous papers. He is also a member of the joint committee on molding sand research of the American Foundrymen's association and the National Research council. He is a member of many technical organizations, the most important being the American Foundrymen's association; the Mining and Metallurgical Society of America; American Institute of Mining and Metallurgical Engineers; the British Institute of Metals; the American Ceramic society; the American Society for Testing Materials and the Franklin institute. He is a member of many of the committees of these organizations.

Almost Everyone Knows This Man

NEXT we have Mr. J. N. Battenfeld. Of course you recognized him in the contest picture which appeared on page 564 of the July 15 issue of THE FOUNDRY. *Mr. Battenfeld was born in Germany in 1863. When only 12 years old, he emigrated to America. His first adventure was in railway work. He became general storekeeper for the Big Four railroad at Bellefontaine, O. Then he heard about molding machines and his entire future was changed. He was connected with the Berkshire Mfg. Co., Cleveland, for a number of years, and later in 1913 started the U. S. Molding Machine Co. of that city. He retired from active business in 1921 and since that time has resided with his two sons, J. R. and P. C. Battenfeld in Kansas City, Mo.*



Cadillac Runs Tidy Coreroom

(*Concluded from Page* 724)

furnace was supplied by the Ajax Metal Co., Philadelphia. Four oil burning furnaces were made by the Monarch Engineering & Mfg. Co., Baltimore.

Nearly all the metal melted falls into five standard classifications:

	Copper	Tin	Lead	Zinc
Bearings	85	5	9	1
Pipes	85	5	5	5
Yellow Brass	65	3	1	31
Bearings (Hard)	88	10		2

A chute is provided under each of the machines in the cleaning room to convey all metallic refuse to bins in the basement. Sand and dust containing metallic particles are treated in slush tanks where the material is immersed in water and agitated to separate the dross from the metal.

The fourth and concluding number of this series dealing with the methods and equipment in the iron foundry of the Cadillac Motor Car Co., Detroit, will appear in an early issue.

A Correction

H. Field, author of the article "Consider White Heart Malleable Casting," appearing on page 546, July 1 issue of THE FOUNDRY was connected with John Harper & Co. Ltd., Willenhall, England instead of Messrs. Harper & Son, as was stated.

Officers Are Elected

E. E. Ferguson has been elected president of the newly organized United Stove Co., Ypsilanti, Mich. Other officers are: Vice president, L. T. Wilcox; secretary, John Lonsky and treasurer, R. B. Haig.

Sustained Interest Key to Safety Success

By Carl B. Auel
President, Nationaly Safet Council

Safety's Ten Commandments

Minimum labor turnover.

* * *

Health and contentment.

* * *

Good lighting.

* * *

Cleanliness and neatness.

* * *

A measured pace. This includes a suitably studied wage system, absence of rush at noon and quitting hours and clean-up period, elimination of driving methods.

* * *

Prohibition.

* * *

Education.

* * *

Intelligence, skill and carefulness.

* * *

Mechanical and equivalent guards.

* * *

English language.

MAINTAINING interest in safety involves the crux of the whole industrial safety problem. It is not overstating matters to say that "a plant can be made as safe as the management and the workers want it to be;" but, if such desire is not in evidence and it is not possible to maintain interest in the work of safety, there can be practically no headway made beyond the first few steps. These steps may be said to embrace simply the mechanical or equivalent guarding of tools and equipment and, of course, may be taken in a more or less perfunctory manner. It is estimated, however, they will not effect a reduction of more than 25 to 35 per cent in the accidents which are likely to occur in an unguarded plant.

The question, therefore, may be asked before going further, "Whose interest is meant, employer, employe or both?"

Considerable has been said and written to the effect that no safety work of any consequence can be carried on in a plant unless the employer has been sold on the idea first. Such statements are true, but have become threadbare with constant repetition and the public at large is led to believe that employers are men differing from ordinary human beings, whose sense of feeling for their fellowmen has become deadened and who can only be awakened to a renewed sense of the fitness of things with respect to safety, health, sanitation, working hours and many other items, by legislation.

Undoubtedly there will be found employers, who measure down to such specification; but the experience of the writer over a number of years in close contact with large employers, experience duplicated by the experience of many others, has shown that such employers usually are far in advance of the general public in matters affecting the welfare of their employes, including their safety, and not from a selfish viewpoint, but from every conceivable one, humanitarian, economic, etc. If, at times, there is an apparent lack of headway in the solution of some problem connected with employes' welfare, it is not so much due to indifference on the part of the employer, as it is to a lack of knowledge of the way in which to proceed to its successful accomplishment. Further, they are only human, and accordingly cannot follow every one of the innumberable matters connected with an industry down to its minutest details but must, perforce, delegate certain individuals as their representatives, clothing them with the necessary authority to act.

In answering the question, therefore, it may be taken for granted that the employer, especially if connected with big business, is usually interested by virtue of his position. But as one goes down the line in managerial authority, clear down to the "underboss," the evidence is not so convincing, so that even if the actual employers' interest does not require stimulation, at least his representatives in the management of the plant are to be included along with the rank and file of employes, whose interest must be maintained.

There are, however, a number of preliminary steps to be taken before any plant management should expect to meet with even a reasonable measure of success in maintaining an interest in safety.

The writer once set down what he thought to be the ten items which would have the greatest effect in reducing accidents in industry and lists

them herewith. These indicate the complexity of the problem originally thought to be such a simple one. Each factor must receive its full share of attention. It would be folly to expect that in any plant in which the opposites of the ten items were rampant, interest in safety or in anything else could be maintained for any appreciable length of time; in other words, the management should not feel that its plant can become, as it were, a melting pot for every conceivable kind of employe, good, bad and indifferent, either as to health, workmanship, citizenship, sobriety, intelligence, carefulness, education, habits and so on, and expect by any scheme thus far known, to mold all of them into safe, sane and desirable workers. Discrimination and care must be shown in their selection. Furthermore, the proper requisites for safety cannot in all fairness be expected to come wholly from the workers. The management should provide its quota of desirable qualities, in treatment and in facilities accorded the employes. Industrial contentment will play its part in solving the accident problem.

A safety engineer must be a broadgage man, preferably one of experience, who can, among other accomplishments, analyze the situation by means of charts, data, etc., with respect to accidents in the plant from time to time and who can further place his conclusions and recommendations before the management with the certainty that they will receive attention. He should moreover be a man who has the qualities of leadership and who can put the problem of safety into nontechnical language for the benefit of the foremen and the rank and file and secure their continuing interest.

Have Organized System

Such a man should not only be permitted but expected and encouraged to visit other plants, attend safety meetings, etc., in an effort to keep abreast of the times as well as to give others the benefit of his own experience. Safety work in a plant is, however, not a one-man job, though it may take only one man to organize it and keep it going. Accordingly, every plant should be organized on a suitable safety basis. While it is not the mention to describe any of the several more prominent forms of safety organizations in use, it is advisable to point out that any organization to be effective must include some of the more intelligent workers among its number, as they can usually be relied upon to transmit the desires of the management to the other workers in language and ways that can best be understood by them; they will also transmit to the management points of view and secure help from the other employes which could not perhaps be so readily obtained in any other manner.

No matter how well organized for safety work a plant may be, unless properly provided with a program requiring active effort, little will be accomplished. For a starting point, data should be obtained as to what others have done in accident prevention work, although it is the writer's opinion that no plant can be compared properly with any other plant, since there are always certain differences between them which should be, but which are not, taken into account. In any event, such data will at least provide a mark at which to shoot and will furnish the safety organization with information to pass to the shop.

Employ Safety Drives

No-accident drives are excellent as reenforcing the data obtained from other concerns and as showing more accurately possibilities in accident reduction in one's own plant. The period of a month is, in general, too long for a drive and it is better to have either two to four drives of one week each or one or two drives of two weeks each. The idea in this is that greater effort will be made over the shorter period, or if one department is not successful in the first attempt, it has a chance to retrieve in the second attempt, without being down and out for department having "clean-sweep" (no accident) records can properly be given some visible trophy like a broom which will proclaim their accomplishments, and, if the broom can be arranged to record subsequent "clean-sweep" performances, its effectiveness is not only increased in the department itself, but its effect on other departments is self-evident.

Other essential data to be accumulated should be the number of accidents and their classification, the accident severity and the accident frequency rates month by month throughout the year, for a progress report must be kept for reference purposes. Whenever safety meetings are held, some or all of this data will be needed to compare present performance with past, the kinds of accidents occurring and where.

A word should be said regarding accident frequency and severity rates. As adopted by the International Association of Industrial Accidents Boards and Commissions, these may be expressed by the following formulas:

$$\text{Frequency} = \frac{\text{No. of accidents}}{\text{Total hours worked}} \times 1{,}000{,}000$$

= Accidents per 1,000,000 hours worked.

$$\text{Severity} = \frac{\text{Total days lost}}{\text{Total hours worked for}} \times 1000$$

= Days lost per 1000 hours worked.

These formulas should be used in making comparisons with other concerns; but the average workman does not grasp the significance of these figures and further, the figures are rather small at best, so in our own plant, we have found it preferable to use instead:

Accident frequency = Total hours worked per accident.

Accident severity = Hours lost per accident.

Every department is provided with a chart containing this and other data which is conspicuously posted where all employes can see the progress, or the reverse, that is being made. These charts, thus form part of our educational work among the employes as well as serving our safety men and committees.

Bulletins are undoubtedly the chief medium of education in most plants and can be secured from any of several sources in most attractive shape. They may be supplemented by others from one's own experience and those latter, if consisting of brief statements without illustrations, can be printed at very low cost. To be thoroughly effective, bulletins should be posted on bulletin boards of good design, favorably located and kept in serviceable condition, both as to repair and as to reading matter; that is to say, bulletins should be posted and removed regularly, though when removed from one department they may again be posted in another. Such bulletins need not always be confined to safety subjects, but may be varied judiciously.

Guard Machines Properly

There can be no greater evidence that the management of a plant is in earnest in dealing with safety than to have all tools and equipment properly guarded. If this has not been done, the effort to put safety across with the employes will fail. In a large plant, even these steps involve a tremendous amount of work, but notwithstanding this handicap, it can be partly offset by having an inventory taken of all tools and equipment from the viewpoint of safety, placing these involving serious hazards in the "immediate attention" class and leaving the others to be given attention in due course.

PREPARING MICROPHOTOGRAPHS OF METALS

I. STANDARD MAGNIFICATIONS

General Use

1. The standard magnifications for general use in making micrographs, expressed in diameters, shall be as follows:

10, 25, 50, 75, 100, 200, 500, 1000.

2. For general use in society reports, and for showing grain size, the following magnifications are recommended:

MATERIAL	CAST	WROUGHT
Steel and Ferrous Materials	100	100
Copper	50 and 100	75
Copper-Zinc Alloys	50 " 100	75
Copper-Nickel Alloys	50 " 100	200
Copper-Nickel-Zinc Alloys	50 " 100	200
Lead-Tin-Antimony Alloys[1]	50 " 200	...

Reproduction of Micrographs

3. (*a*) Reproductions of micrographs in publications shall be made of exact standard magnifications except in those special cases where the details of structure are to be illustrated.

(*b*) If micrographs submitted for publication are not of standard magnification, they shall be enlarged or reduced to the nearest standard size. The actual magnification appearing in print shall be stated under the micrograph. See paragraph (*d*).

(*c*) To facilitate the reproduction, authors should be advised that their micrographs should be of proper size to fit the printed page, and in order to conserve space that micrographs be printed in the form of squares.

(*d*) With each micrograph shall be printed an explanatory title, together with actual magnification, etching medium, treatment, etc., indicating what the author intends to show, so that it will not be necessary to search the text for general information. With micrographs at magnifications of approximately 500 diameters and above, the numerical aperture of the objective and the type of illuminator shall be given.

(*e*) Photographs in which the magnification is less than 10 diameters are usually made with photographic lenses or single magnifiers. These will be considered as "macrographs."

With each macrograph should be printed an explanatory title, together with the actual magnifications, method of illumination, and general treatment indicating what the author desires to illustrate, so that it will not be necessary to refer to the text for general information.

[1]Including those containing small percentages of copper.

Standard Specifications of American Society of Testing Materials—Serial Designation E 2-24.

(*Continued On Data Sheet No. 590*)

PREPARING MICROPHOTOGRAPHS OF METALS

(*Continued From Data Sheet No. 589*)

II. LENSES

4. For obtaining the magnifications recommended, the following types of lenses are suggested as suitable for general commercial work:

(*a*) For magnifications from 20 to 30: A photographic lense of approximately 35-mm. focal length, to be used without ocular.

(*b*) For magnifications from 30 to 75: A 32-mm. objective with Huyghens ocular (approximately ×5).

(*c*) For magnifications from 75 to 150: A 16-mm. objective with Huyghens ocular (approximately ×5).

(*d*) For magnifications from 250 to 500: A 4-mm. objective (preferably apochromatic) with projection ocular.

Directions

5. (*a*) All objectives should be corrected for use without cover glasses.

(*b*) In using one of the lens combinations given above, the length of the camera bellows may be adjusted to give the exact magnification desired.

It should be borne in mind, however, that increasing the magnification by increasing the length of the camera bellows adds nothing to the detail of the micrograph. This depends mainly upon the resolving power of the objective used.

(*c*) The magnification shall be determined by accurately measuring the image of a stage micrometer scale, and not by estimation from lens combinations, or microscope or camera adjustments.

III. GRAIN SIZE

Definition of Grain

6. (*a*) *Alloys Consisting of but One Type of Crystals* (*e. g.*, copper, alpha brass, etc.): In counting individual grains the original crystal, including the twinned layers, shall be called one grain.

(*b*) *Alloys Consisting of Two Metallographic Components* (*e. g.*, steels, muntz metal, etc.): The original grain which has given rise to the aggregation of the two components shall be taken as the unit when determinable and the individual component in other cases.[2] When grain size is included in actual specifications, the term should always be defined in such specifications.

Method of Measurement of Grain Size

7. For measuring grain size, two methods are recommended depending upon the condition of the material:

(*a*) *For Material in which the Grains are Equi-axed* (*e. g.*, most metals in the cast and in the annealed state): The planimetric method as modified by Jeffries (See note Data Sheet No. 591) is recommended for use. It is recommended that the circular area used should always include at least 50 grains.

[2]See U. S. Navy specifications, 49-S-2-c. p. 7.

(*Continued On Data Sheet No. 591*)

Note—This sheet may be cut into two sections, 5 x 7 inches, and may be readily bound in note book form.

THE FOUNDRY DATA SHEET, SEPT. 15, 1925

Payment will be made for all contributions on foundry and pattern shop practice suitable for publication

Around the World with The Foundry

Little Journeys to the homes of our readers

England

SUPREME, confident, haughty, mistress of the seven seas, with flaming outposts in every one of the great divisions of the earth's surface, the little island in the North Sea is the heart and brain of the mightiest empire the world has ever known. Her great blood red banner is accepted as the symbol of law and order over one quarter of the world's surface and 400,000,000 of the earth's inhabitants acknowledge allegiance to the Royal Crown of England.

Supreme upon the seas for several centuries, today her navy outclasses that of any of the other great powers and in addition over 40 per cent of the world's commerce is borne in British bottoms.

England has no need to import iron, steel, malleable iron, brass or aluminum castings to keep her great ship yards, blast furnaces, steel mills, cotton factories, and thousands of other manufacturing plants going to capacity.

Cautious, conservative, reliable, John Bull stands solidly on his own two feet, a highly competent and skillful mechanic. He does not take kindly to changes or innovation and as a rule does not pay much attention to the opinion of others. When he places the seal of approval on any thing it is only after the most thorough and painstaking examination. There must be something just right about THE FOUNDRY when 800 executives connected with approximately one third of the total number of foundries in England look forward eagerly twice a month to its reception.

"Wherever metals are cast you'll find THE FOUNDRY"

This inventory may need to be retaken in whole or part at certain intervals, if rearrangement of any department of the plant is made later.

A suitable suggestion system will be found of material aid. Not only will suggestions be made covering hazards either overlooked in the inventory or which have developed subsequently but further improvements will be offered for guards already installed which will often prove well worth while. A suggestion system, to be really effective, needs an incentive. One system with which the writer is acquainted, accomplishes this by offering in addition to the award paid for the suggestion itself a further award consisting of $10 for the first five accepted suggestions; $5 for the second five accepted and so on.

Some plants have found, either as a substitute for or in addition to their safety committee, a "safety patrol" to be of wonderful assistance in safety work. Briefly, a body of men is formed among the workers in a plant, one or more being selected from each department and instructed to patrol their respective departments and observe the employes to see that they are handling themselves and their equipment properly; for example, to see that they are not wearing gloves where such would involve a hazard, not using imperfect tools, not chipping toward an aisle, wearing goggles when necessary, seeing whether or not guards are in place, whether or not there are tripping hazards, etc. For the time spent away from their regular occupations, they are paid their average earned hourly rates.

Safety meetings should be held at intervals, just who should participate and how frequent the intervals depending on conditions. An occasional rally attended by everyone connected with a plant is quite in order, as is a nonaccident drive, but it is not so much the spectacular as the day-in-day-out effort that counts. The writer is an advocate of fairly frequent meetings, say from one to three months apart, of departmental heads, superintendents and assistant superintendents; of individual departments, superintendents, foremen, bosses, etc.; and of safety patrols.

In any courses of instruction for the supervisory forces one or more talks should be devoted to safety. In one works where such courses exist, the subject has been handled successfully by means of a questionnaire. A list of elementary questions on safety has been prepared by the safety department, which centers mainly around the employe from the time he first enters the plant until the time when he is thoroughly well acquainted. There are also certain questions touching on the workmen's compensation laws and a comparison of accident losses with other wastes in the plant. The instructors who conduct these classes were provided originally with at least one answer to each question so that they would not be stumped for a suitable reply to each of their own questions.

Generally speaking, at safety meetings matters immediately concerning safety in the plant itself should form the subjects of discussion, and "home" talent can always be found to provide the ammunition necessary to make such meetings interesting. Review may be made of the accidents which have actually occurred in a department since the last meeting, the scene of an accident may be visited and recommendations made with a view to the prevention of any recurrence. Talks by the plant doctor may be given on first aid, prone pressure method of resuscitation, eyes and the dangers of infection. The informal heart-to-heart talks are preferable.

Many employes have little or no idea of the way industrial safety has taken hold in this country and are inclined to look upon any effort in their own plant to make conditions safe as silly or effeminate. If, therefore, from among the employes a few leaders can be selected and sent to attend occasional meetings outside of their own plant, including the annual congress of the National Safety council they are selected to speak at some of the safety meetings in their own plant, and the expense will be justified.

An inspection of a plant from the viewpoint of cleanliness and neatness should be made at regular intervals by a well-mixed committee of staff and workers, reports of the findings being sent direct to the superintendent or works manager, as the case may be, and signed preferably by the entire committee.

Employers should bear in mind that safety work ought to be entered into not only with the object of getting results in their own plants, but also of lending assistance in the solution of the problem as a whole. The first can be accomplished, in part at least, by installing safety methods of which a few of the more prominent have been sketched briefly; the second, by participating actively movement outside of one's own plant.

When and What To Inspect

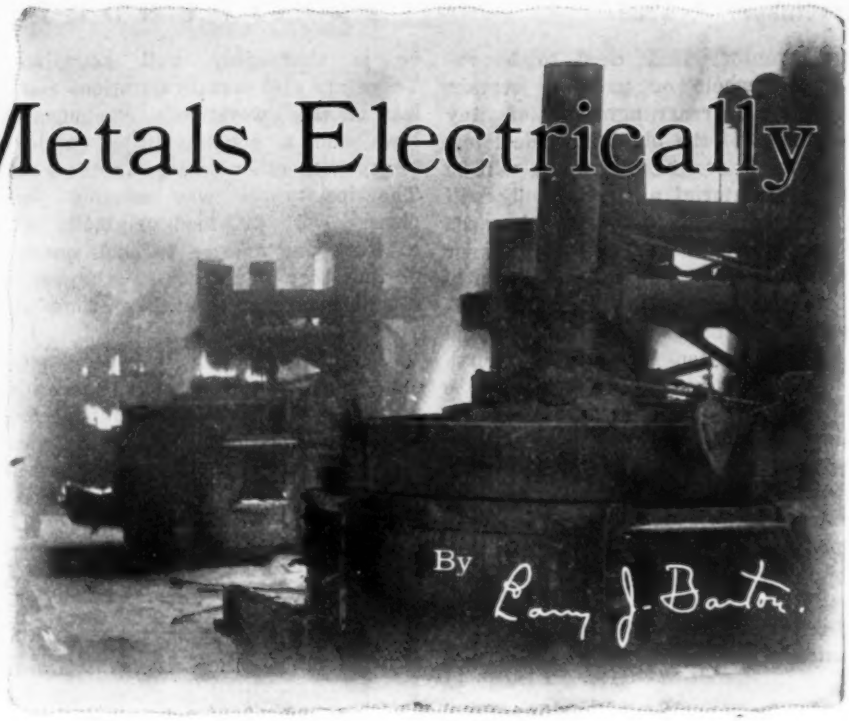
THE writer believes as fully in plant inspection for the prevention of accident as in the inspection of raw material coming into a plant or for finished material shipped out. To this end, there has been instituted in the works with which he is connected a regular system of inspection of a considerable number of small items involving accident hazards, some of which are not so obvious as are those of large items, cranes, elevators and the like. The following table gives the items thus far included:

	Interval between inspections
Electrical shop hazards	6 months
Hand trucks	6 months
Ladders, portable and stationary	6 months
Window cleaners' belts and window eyes	6 months
Stretcher cabinets	12 months
First-aid cabinets	Weekly
Crane operators, physical examination	12 months
Food handlers, physical examination	6 months
Hand tools, mushroom heads, broken and missing handles, etc.	6 months
Tools and equipment, mechanical guarding. In case of rearrangement of department or plant	
Crane chains and hooks	Constantly
Cranes	Constantly
Elevators	Constantly
Gas masks	12 months
Emery wheels, guards and water supply	6 months
Hydraulic elevator tanks	12 months
Bulletin boards	As bulletins are posted
Goggles, sterilizing outfits	6 months
Warning signs	12 months
Safety meetings	1 to 3 months
Stair treads and railings	3 months

Refining Metals Electrically

Chapter IX

Basic Costs of Electric Furnace Melting Compared



PRESENTATION of cost data covering the production of electric furnace iron and steel for castings is difficult, due to the differing conditions found in various shops and localities. However, certain similarities exist in all operations, and if detailed figures can be obtained covering the specific items mentioned, the results can be changed to cover the situation for any certain set of conditions.

While the final cost of the castings themselves is the most important item for any shop, this is impossible of general discussion, due to the wide differences of castings made. One shop specializes on heavy jobbing work; another on light castings capable of quantity production; while yet another makes small jobbing work only. Therefore, the only figures which will mean anything are those covering the cost of the molten metal in the ladle.

Costs of steel in the ladle will vary directly according to:

Continuity of operation.
Process, whether acid or basic.
Size and make of furnace.
Class of product being made.
Cost of power and labor.
Geographical location.
Efficiency of operations.

The furnace operating continuously naturally will make cheaper steel, than one running only two or three heats a day, due to the ability always to melt on a hot hearth. This will manifest itself by cheaper power costs, less electrode consumption, less labor cost per ton of metal, greater refractory life, and a much lower figure for fixed costs per ton.

The acid process will be found cheaper than the basic, due to the shorter length of time required for a heat, the saving in slag materials, and the greater tonnage produced over a certain length of time.

A new modern type of furnace will make cheaper steel than an old antiquated one. The larger furnace will make cheaper metal, due to the greater tonnages produced, and the greater efficiency obtained from melting larger units of metal at one time.

The shop making the smaller sizes of work, will require hotter metal than the shop making large, heavy castings, causing a rise in the costs of metal by increasing the figures for conversion.

Costs of power and labor vary greatly in different localities giving rise to great differences in the cost of manufacture.

The geographical location of the shop is important on account of the freight charges for materials. Certain articles necessary for the electric furnace are made only in the eastern part of the country, as for instance, the following: Ferro alloys, electrodes, certain classes of refractories, stopper heads, etc. Naturally, the shop in the south or the far west is at a disadvantage in the cost of such necessities.

The efficiency of operation is by far the most important point of the lot. The writer has seen shops having a preference in costs lose out time after time on bidding for a certain job, merely on account of the greater operating efficiency in the less favored concern. This efficiency of operation manifests itself in many ways. An efficient shop has fewer lost castings due to better quality of metal and more careful floor work. It has less unnecessary heating of the metal for a certain heat and produces a greater tonnage per man per month. All of these are points directly traceable to the quality of supervision, and amount to a considerable figure at the end of a year. To the new shop starting on an electric furnace career; one suggestion is offered. Obtain the services of the best man it is possible to get. A man worth ten thousand dollars a year will save his salary many times over, and will prove to be a big asset, while a cheap man will prove dear at any price.

Estimated costs of metal made in certain types of electric furnace, often are put out by the manufacturers of the furnace. Such figures are made up for a set of special results or conditions impossible to obtain under the average shops operation. In the data on specific costs which follow, the author has attempted to pick out various cases differing sufficiently so that a parallel may be drawn for shops

Personal Equation

THAT individual factor, known as the personal equation, which enters into every human accomplishment, looms large in gathering and presenting cost data. It is still further exaggerated when comparative costs are given. Therefore, the author in presenting electric furnace costs confines himself largely to recommending methods, outlining the different expense items and drawing attention to the various effects of plant location, metal requirements and operating conditions which will exert a marked influence on the correct assembling of cost figures.

operating under almost any set of conditions. Consequently, costs covering lengthy periods of time have been chosen that the law of averages may operate and give figures of actual worth. Instances given have been taken from actual operating figures, and the many details are included as far as is possible.

EXAMPLE NO. 1

Conditions of Operation

This shop is located on the Pacific coast, and is operating a 6-ton Heroult furnace on a basic hearth. The operations continue over the entire 24 hours, the product being large sized work, requiring rather low temperatures to pour. The two slag process is used, the scrap being rather high in phosphorus and sulphur. Heats are poured after holding under a carbide slag for approximately 45 minutes.

Power is obtained at a flat energy rate of 1 cent per kilowatt hour, with no demand, which constitutes a low figure. Labor was at this time rather high, first helpers being paid 77 cents per hour, while common labor cost 59 cents per hour. Three men were on the furnace, one handling the ladles, and pouring the steel, while four laborers were used to charge the furnace.

It will be observed from the following costs of materials that some items, due to the high freight rates, are abnormal.

Electrodes cost 9 cents per pound, laid down at the furnace.

Lime, 1.21 cents per pound.

Fluorspar, 85 per cent, 1.59 cents, pound.

Coke, crushed, 1.26 cents, pound.

Ferromanganese, 9.23 cents, pound.

Ferrosilicon, 50 per cent, 3.95 cents, pound.

Magnesite and refractories were purchased locally at standard figures.

Conversion Cost

Labor:	
3 first helpers, 3 ladlemen, 3 helpers, 12 laborers, to charge	$ 2.09
Power:	
575 kilowatt hour per ton	5.75
Repairs and renewals:	
Brick, patching,and electrodes	3.60
Slag materials:	
Lime, 79.5 pounds per ton	0.96
Spar, 12.1 pounds per ton	0.19
Coke, 7.1 pounds per ton	0.105
Alloys:	
Ferromanganese, 9.8 pounds ton	0.905
Ferrosilicon, 8.9 pounds per ton	0.355
Scrap	
$16.40 per net ton @ 2.53 per cent loss	16.80
Supervision and fixed charges	2.30
Total per net ton of metal in the ladle	$33.055

This furnace poured on the average 5.5 heats of 7.0 tons each in 24 hours, or approximately 1000 tons per month. The figures covered the six months run from April to September, 1921, prices being those in effect at that time.

EXAMPLE NO. 2

The data in this example cover the comparative operation of a 6-ton Heroult furnace, basic lined, in opposition to a 20-ton, open-hearth furnace, acid process. The figures are for a four months' period, during 1920, and are those covering actual operations as observed by E. H. Ballard, General Electric Co., Schenectady and reported by him in a paper prepared for the American Foundrymen's association. The electric furnace was operated during the day only, two heats being poured in this time, approximating 310 tons of metal per month, the steel being poured into a miscellaneous assortment of work. The costs are given in Table LXIII.

TABLE LXIII

Electric Furnace Costs

Per cent	Item charged	Price	Cost per net ton
1.00	Pig iron	$ 51.00 G. T.	$ 0.46
20.13	Shop returns	18.00 G. T.	
1.64	Defective castings	18.00 G. T.	3.50
15.63	Miscellaneous scrap	21.25 G. T.	2.97
0.49	Nickel turnings	21.50 G. T.	0.09
58.71	Steel turnings	8.50 G. T.	4.45
0.55	Nickel Accumulations	21.50 G. T.	0.11
0.60	Iron borings	12.00 G. T.	0.06
97.75		12.80 G. T.	11.18
	Special metals:		
0.54	Ferrosilicon	155.00 G. T.	0.74
0.37	Ferromanganese	225.00 G. T.	0.74
0.09	Wash metal	71.20 G. T.	0.06
0.07	Aluminum-Titanium	166.90 G. T.	0.12
0.04	Nickel	0.50 lb.	0.38
0.06	Copper	20.16 100 lbs.	0.23
0.08	Iron ore	9.16 G. T.	0.01
1.25		204.38 G. T.	2.28
100.00	Total metals charged	15.59 G. T.	13.92
	Molten metal cost:		
	Cost of metals		13.92
	Direct labor		2.00
	Items of expense (per detail below)		21.58
100.00	Total cost of melt		27.50
8.00	Shrinkage		
92.00	Cost of metal in ladle		40.52
30.90	Credit—scrap produced	$ 16.16 N. T.	
61.10	Good castings produced		53.06
	Summary of expense:		
	Electrodes, 30 pounds per net ton 0.08 pound		2.52
	Current, 720 kilowatt hour per ton 1.25c kilowatt		9.05
	Oil for ladle, 0.079 gallon		0.26
	Water		0.24
	Slagging and patching:		
	Sand, lime, spar, coke, carbon, syndalag		1.80
	Ladle repairs		1.43
	Furnace repairs		1.27
	Royalty (44.6c per net ton output)		0.27
	Depreciation 10 per cent		1.14
	Expense—labor		1.30
	Expense—all other		3.50
	Total melting expense		$ 21.58

Heats poured 131.
Average weight per heat, 13,918 pounds.
Cost data cover 912 tons produced.

On analyzing these costs certain items are found which under different conditions could be changed: The cost of nickel and copper from special metals may be omitted, giving a reduction of $0.49 per ton. The large loss of 8 per cent probably was due to the great proportion of borings used, and should not be charged against the expense covering special metals. By using the one slag process a reasonable saving should be effected in the cost of slag making materials, with probably a slightly lower power, electrode and refractory consumption.

The figures from the open hearth operating over the same period are as follows:

	Per Net Ton
Molten metal cost	
Cost of metals	$22.70
Direct labor	0.83
Items of expense	9.95
Total cost of melt	33.48

However, the percentage of good castings from this process was only 56.34 per cent so that the cost of the steel in the castings amounted to $49.24 per net ton, or only $3.82 per net ton less than that from the electric furnace.

Considering the extra quality from the electric furnace, and the fact that this shop is located close to the heart of the pig iron country, these figures are favorable for the cost of

the metal from the electric furnace. The difference easily could be changed the other way by a shop further removed from the source of its pig iron, the freight charges raising as the distance increased.

Dr. Moldenke To Receive Seaman Medal

(*Concluded from Page* 727)

and incidentally rendered great service to the company with which he was identified.

In 1897, Dr. Moldenke became a member of the Pittsburgh Foundrymen's association, and a few months later joined the infant American Foundrymen's association. In the latter organization he became associated with such men as Thomas D. West, A. E. Outerbridge Jr., W. J. Keep, E. H. Putnam, W. G. Scott and others, who were the pioneers both in investigation and dissemination of foundry knowledge. This period really constitutes the start of modern American foundry practice and these men blazed the trail.

In 1899, he was prominent in the organization of the Pennsylvania Malleable Co., Pittsburgh, and acted as superintendent of that establishment until family conditions necessitated his giving up this work to devote all of his time to private interests. At this time, Dr. Moldenke was elected secretary of the American Foundrymen's association, his selection being announced in Chicago in 1900. During his term of office, which extended until 1914, he witnessed the growth of that great association from a small working body of few members to one of the leading technical organizations of the world. Its work came to be recognized in every country and its influence contributed to the formation of similar societies in England, France, Germany, Belgium and Sweden. The experience of the secretary in practical and scientific matters always was given freely and he felt at all times his responsibility to the industry did not cease with the performance of the routine functions of his office. His restless craving for metallurgical research led him to originate and follow through some of the most valuable investigations which have been undertaken in the field of foundry science. His cupola study served to revise charging methods and to effect great economies in plant operation. Similarly his study of coke, culminating in an investigation conducted at St. Louis, during the world exposition in that city, led to a new understanding of that basic fuel.

Connection with the American Foundrymen's association brought Dr. Moldenke into international prominence and later through his affiliation with the International and American Societies for Testing Materials, he served on notable committees having for their purpose the investigation and specifying of foundry materials. His latest important work has been in the advancement of an international standard for comparison of cast iron, in which he has served with Walter Wood and other prominent men.

Foundry literature, except for a few exceptions, has seen its greatest growth during the lifetime and service of Dr. Moldenke. He has been a most prolific writer on foundry and metallurgical subjects since 1897, his work in these lines ranging from his basic textbook, *Principles of Iron Founding*, through many articles, pamphlets and treatises on commodities used in foundry practice on methods ,and special alloys. A noteworthy book on malleable iron ranks with his *Principles*, previously mentioned as an outstanding achievement.

During recent years, in addition to his technical society work, Dr. Moldenke has acted in an advisory capacity to foundries in this country and abroad and to a number of large manufacturing firms such as the Bethlehem Steel Co., Bethlehem, Pa., Corn Products Refining Co., and in a semi-official way to the bureau of mines. He is an honorary member of the American Foundrymen's association, the Institute of British Foundrymen, the Pittsburgh, New England and Newark Foundrymen's associations. He was vice president of the American Society for Testing Materials and holds active membership in the American Institute of Mining Engineers, the American Society of Mechanical Engineers, the American Electrochemical society, the British Iron & Steel institute and the German Verein Deutscher Eisenhuttenleute.

Dr. Moldenke's home is at Watchung, N. J., where in his unique mansion he has established a small experimental foundry, complete in every detail even to the cupola.

Glass House Plungers

Question: We propose making glass house plungers weighing from five to 50 pounds, one to 6-inch diameter and four to 12 inches long. We wish to produce a clean close grained iron as tough as possible and not too hard to be machined. We would like for you to instruct us as to the best pig iron to use and suitable mixture to give us the most satisfactory results.

Answer: Owing to the wide range in size and weight it would be more satisfactory to use two mixtures—one for the light castings and the other for the medium and heavy. This would insure you a more uniform grade of iron covering structure and physical property of the different size castings for the reason that if the small size castings were found to be satisfactory, the large size castings would be coarse grained and weak and then again if the large castings were satisfactory as to grain and strength, the smaller castings would have a tendency to have a surface chill.

For the light plungers poured in green sand molds the approximate analysis should be as follows:

MIXTURES FOR LIGHT PLUNGERS

	Per cent
Silicon	1.50-1.75
Sulphur not over	.095
Phosphorus	.30- .50
Manganese	.50-1.00

For the medium and heavy plungers the analysis of the casting should run approximately:

MIXTURES FOR HEAVY PLUNGERS

	Per cent
Silicon	1.00-1.25
Sulphur	.075
Phosphorus	.30
Manganese	.75-1.00

If your pig iron requirements are not large and you wish to purchase a pig iron for making average machinery castings, it should be covered by the following specifications:

	Per cent
Silicon	2.25-2.50
Sulphur not over	.050
Phosphorus	.30- .50
Manganese	.60-1.00

With such a pig iron you can make up mixtures as follows:

FOR HEAVY CASTINGS

	Per cent
Pig iron	50
Return scrap	30
Steel scrap	20

FOR MEDIUM CASTINGS

	Per cent
Pig iron	50
Return scrap	40
Steel scrap	10

FOR LIGHT CASTINGS

	Per cent
Pig iron	50
Return scrap	50

The percentages as given above are only approximate and will be governed solely by your working conditions.

Making Art Bronze Castings

Substitute Methods and Materials Were Employed in Experiments To Find Alternative for the Lost Wax Process

By W. W. Boone

MANY methods are available for the production of complicated bronze castings. The *cire perdu* or lost wax process commends itself in many respects where only one casting is required, but when it becomes necessary to produce many duplicate castings the method presents certain objectionable features. A wax reproduction of the original model has to be made for each casting and a plaster piece mold has to be prepared for the production of the wax reproductions. A considerable degree of technical skill and knowledge are required to make one of these non-flexible molds in many pieces. In many instances a flexible gelatin mold is taken from the model. This is used for making the wax impressions.

While experimenting along this line it was found that even a wax that could be poured at a low temperature, always softened the gelatin sufficiently to cause loss of detail in the next following wax figure. The wax used for the purpose was compounded from ozokerite 25 pounds, paraffin 12 pounds, rosin 4 pounds. Vaseline was added in small amounts to soften the wax and further lower the melting point. This mixture was poured at a temperature of 125 degrees Fahr. Glycerine was added to the gelatin to prevent brittleness and the inside of the mold was painted with alum water or formaldehyde to render it insoluble and increase its resistance to heat. Eventually the molds split and develop cracks at important points on account of the formaldehyde and the temperature changes.

FIG. 1—SOLID BRONZE MADE IN RUBBER-PLASTER MOLD

Two methods were tried to obtain bronze castings from the wax images. In the first the wax image was rammed in a fine sand. The mold then was heated in an oven until the wax had melted and flowed out of the mold, thus leaving a space for the reception of the bronze.

In the second method a hard shell ¼-inch thick was built around the wax. The material for the shell was compounded from plaster of paris 4 parts, fire clay 1 part, asbestos fibers 1 part. This was mixed with water to the consistency of paste. The shell became hard in a short time and then was placed in an oven where it was heated to expel all the wax, grease and moisture. Before the metal was poured, the shell was packed in sand. These shells were porous enough to be self venting and they peeled readily from the castings. Castings were better than those obtained from the sand molds, probably due to the fact that the wax was more completely removed through a thorough baking.

A considerable measure of success was obtained in electroplating the wax image with a copper shell. The copper covered image was placed in hot water to melt the wax and remove it. Gasoline was used to completely remove all traces of wax from the interior of the copper shell. The shell then either was enclosed in rammed sand or covered with the plaster combination referred to previously, where it was filled with molten bronze. Preheating the shells insured a perfect fusion between the bronze and the copper.

FIG. 2—COPPER SHELL WITH FUSIBLE METAL MELTED OUT

Extreme care was needed in ramming the sand around any of the shells less than 0.030-inch in thickness. On several occasions the sand was rammed around the shell before the wax was removed, but considerable difficulty was experienced afterward in removing the wax. The best castings were secured from the plaster molds. The principal advantage of the electro-shell method is that no wax is present to be absorbed by the material forming the outside of the mold during the wax melting process. As stated previously the wax is removed from the shell before the sand or the plaster is applied to the outside of the shell.

Electrolyte for wax plating was prepared according to the following formula per gallon of water:

Copper sulphate .....32 ounces
Sulphuric acid .....10 ounces
Gelatin .....Small quantity
Current density, 10 amperes per square foot.

On images with deep cavities and convolutions involving considerable

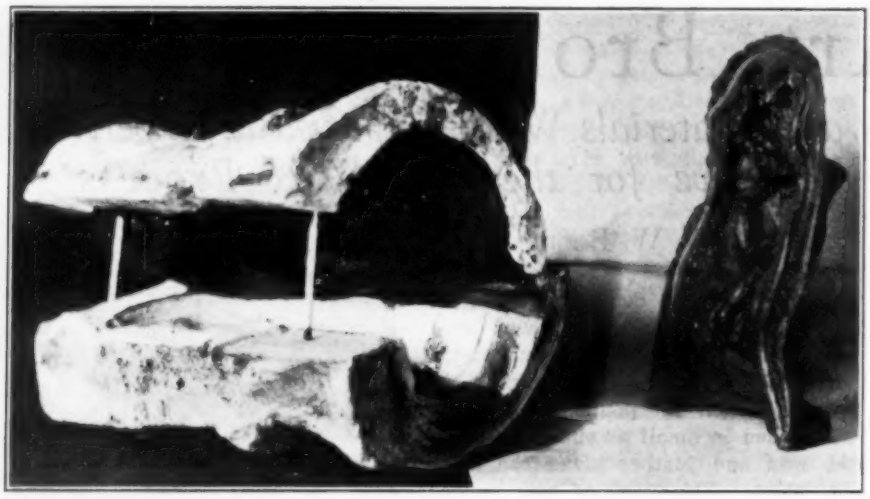


FIG. 3—FLEXIBLE MOLD EASILY REMOVED FROM BACK DRAFTED PROJECTIONS ON THE PATTERN AND CASTING

throwing power of the copper, the wax surface was rendered conductive in the following manner: A saturated solution of silver nitrate in alcohol was brushed over the wax with a fine brush and allowed to dry. The alcohol cut the wax and evaporating left a thin, uniform film of the silver salt over the wax surface. The image then was suspended in a box and subjected to the action of hydrogen sulphide gas from a generator. A thin, conductive film of silver sulphide immediately was produced upon which fine grain metal from the copper solution was deposited.

Rubber Molds

Rubber molds backed with plaster of paris finally were employed. One of these molds in which a number of complicated wax and metal statues were poured without any deleterious effect, is shown in Figs. 3 and 4. One of these molds literally may be turned inside out to facilitate removal from objects with back drafts and undercuts.

Beautifully sharp casts were secured in a number of instances where a low melting metal alloy was poured into the mold. This alloy had a melting point of 158 degrees Fahr. and was composed of the following:

Cadmium	3 parts
Tin	4 parts
Bismuth	15 parts
Lead	8 parts

The castings formed of this alloy were copper plated and then the fusible alloy inside the copper melted out in hot water; a process which left the interior of the copper shell tinned. One of the shells at this stage is shown in Fig. 2. Afterward the shell was filled with either bronze or lead in the manner previously explained. The bottom was soldered over smoothly and the statue again plated to cover the bottom and make the surface uniform. The finished figures finally were given either an artificial antique patina or were plated in brass or silver. The solid bronze statue shown in Fig. 1 was made in the rubber mold shown in Figs. 3 and 4.

Certain alloys with a melting point even lower than that indicated in a preceding paragraph, may be employed and even may be poured in gelatin molds. However, these alloys contain mercury and present a risk of amalgamation with the copper used in plating or the bronze used in filling the shell later.

Out of the many methods tried, the most satisfactory results were obtained by ramming the fusible metal statues in sand or in covering them with the plaster-asbestos mixture and then melting the fusible metal and removing it from the interior. This process leaves a smooth faced mold and produces excellent castings. With the lost metal process no gas producing material is absorbed by the mold and the baking temperature is quite low. In making ten of the statues shown in Fig. 1 the amount of alloy actually lost in making and remaking the pattern only amounted to 0.25 per cent.

Exceedingly complicated figures easily may be secured by pouring a low fusible alloy into an elastic mold of gelatin or rubber. This object then may be packed in some suitable molding material and subsequently melted out. The mold then will be in excellent condition for the reception of metal with a higher melting point.

Change Capitol Office of The Foundry

The Washington office of THE FOUNDRY has been moved from 84 Home Life building to 401 Westory building where additional facilities are furnished to provide service for readers of the publication.

H. S. Getty & Co. Inc., Philadelphia, has removed its offices and plant from 1539 Cabot street and 1415 Germantown avenue, to its new building at 10th and Thayer streets.

FIG. 4—THE PLASTIC COMPOSITION IN THE MOLD IS BUILT UP TO A THICKNESS OF ABOUT ¼-INCH

How and Why in Brass Founding

By Charles Vickers

Atmosphere Is Reducing

We are making mill brasses and experience considerable trouble through sponginess. The approximate composition of the metal is scrap copper 528 *pounds, gates and other surplus metal* 550 *pounds, tin* 46½ *pounds, lead* 12 *pounds, and zinc* 13½ *pounds. We add* 3 *pounds of phosphor copper to each heat. The melting is done in a tea-pot-type furnace. The bearings weigh about* 100 *pounds and the holes do not appear until a cut has been taken from the surface.*

The chances are there is something wrong with the manner in which the furnace is being managed. Judging from the fact of the phosphor copper fails to promote sound castings, it would appear too much oil is being used, resulting in a reducing atmosphere within the furnace. Either reduce the oil supply or increase the air supply since it is likely the furnace atmosphere lacks oxygen. Sponginess and porosity not always are due to *burnt* or oxidized metal, or to sulphur dioxide from using high sulphur fuels. If melting with an oxidizing atmosphere fails to eliminate the holes, find out how much sulphur the oil is carrying, and if it is high, use a flux of lime and fluorspar, half and half, which will reduce the sulphur in the metal to where it will not be harmful. While 0.25 per cent of phosphor copper ought to be enough to ensure solidity, cases have been known where it has failed and 0.5 per cent has succeeded in producing solid castings. However, it is not necessary to increase the prosphorus if the melting has been done with a smoky flame, because changing this condition will eliminate the porosity. A porous mill brass will give better service than a solid mill brass because the holes get filled with lubricant. It would be a difficult matter to produce such castings right along, every casting would then be sound and dense.

Find Air Pockets

We are making covers of aluminum alloy and experience difficulty as they show air pockets after finishing. We melt the aluminum in a No. 70 *crucible, using No.* 12 *aluminum fluxed with chloride of zinc. We shall be glad to receive your suggestions.*

When holes are found in castings of aluminum, more frequently than not, they are due to pouring the metal at too high a temperature, or to using a mold too dense for the gases to escape as the hot metal flows over the surfaces. A flat piece is especially liable to be gassed as the mold must be extremely premeable to enable the gas or steam to sink into it. If the gas fails to do this, it comes up through the metal and causes the latter to flutter and lie unquietly. The first thing to determine is the pouring temperature, which is done by pouring a line of molds at different temperatures, cooling the metal after each mold has been poured. If the castings poured as cool as the metal will flow are found spongy, then it must be either the sand is too close or it has been rammed too hard. It always is advisable in the case of molds for flat pieces, to vent the drag, using a thin vent wire, then make careful provision to enable the gas to get away and not be imprisoned against the bottom board. In this manner the difficulty will be traced to its source and a remedy then is easy to apply.

Casting Must Resist High Temperatures

We desire a formula for a metal to be used for a heat-resisting casting subjected to around 1800 *degrees Fahr. and on account of intricate shape and repeated heating and cooling, it must have elongation equal to steel. The tensile strength is not important, but the casting must be machinable. We have thought of using the following formula: Copper* 40 *per cent; nickel* 36 *per cent; ferrochromium* 10 *per cent; iron* 14 *per cent.*

We have no data regarding the heat-resisting properties of the alloy given and, therefore, suggest that monel metal be used in preference. The alloy of copper, nickel, chromium and iron will be just as difficult to melt and cast as the monel and when the work is done it will be necessary to put the castings through tests, with the chances favoring failure.

The melting point of monel metal is 2480 degrees Fahr., and it is little affected by heat up to temperatures of 1000 degrees Fahr. Beyond that temperature the strength of the alloy will fall off rapidly and at 1800 degrees Fahr. will be considerably less than what may be expected at 1000 degrees. Its ductility at this high temperature also will be low compared to its normal ductility. We believe though monel metal is the best alloy to experiment with in cases where an alloy containing copper is desired. An alloy reputed to withstand temperatures up to 1800 degrees Fahr. is as follows: Nickel 60 per cent; chromium 14 per cent; iron 26 per cent.

Cracks and Shrinkage in Heavy Bushings

We are making heavy bushings and experience trouble due to cracks and shrinkage in the upper end which show as fissures in the metal thickness after the casting is machined. We use an alloy of copper 79 *per cent; tin* 8 *per cent; lead* 15 *per cent, and pour the castings rather hot. Will this hot pouring cause the shrinkage? The difficulty is only experienced with the heavy bushings, the lighter section castings being satisfactory. Possibly you may be able to suggest a more suitable mixture; one that will be free of this shrinkage trouble.*

The question of whether hot pouring causes such shrinkage may be settled by making a test, but it usually works the other way about, and castings hot poured will not shrink as much as castings poured cool. In fact, it frequently is necessary to pour quite heavy castings hot, to avoid shrinkage.

If the fissures are produced by shrinkage, which appears probable, it is necessary to place feeders on the upper end of the casting to get them sound. If the casting is 4½ inches in diameter and has a 1-inch diameter core through it, a riser at least 3 inches in diameter should be located in the cope about 1 inch away from the casting and should be connected to the latter by a gate 1½ inches deep and 1 inch wide, made sloping up into the riser above the casting. This riser should be built up 4 inches higher than the top of the cope, using a bushing for the purpose. After the sprue has been filled with metal, cover it with molding sand and bed a weight upon it to hold in the metal. Gradually fill up the riser to the top of the bushing. This will eliminate shrink holes and fissures.

Bill Comments on Weight of the Day's Work

BY PAT DWYER

HAVING seen or heard nothing of Bill for several days, I decided the other night to visit him at his house and find out the cause of his nonappearance. Usually when I arrive home in the evening I remove the collar and chain, the badge of servitude, hang up the coat and hat, don a pair of slippers and an old pair of trousers and sit on the veranda in fair imitation of an independent citizen who has nothing to do but watch the rest of the world go by.

Failure to observe the usual routine arouses suspicion and excites comment. I remember when I was a little boy the sight of mother washing her face in the afternoon always called forth a volley of questions as to where she was going and if she intended to buy us anything downtown. Now in my own case I find history repeating itself. When I fail to lay aside the formal garments on my arrival at home I am bombarded with questions touching on my possible destination.

A light and evasive reply to the effect that I have been invited to play the ukelele at a musicale in the home of the mayor is accepted by the children with mental reservations. This suspicious attitude may be due in part to the fact that they never have seen me handle one of these apologies for a musical instrument. Their mother is not impressed. She cannot see for the life of her what possible pleasure I can derive from telling the children such stories. Goodness knows they hear enough of what they should not hear outside without exposing them to pernicious influence at home. My somewhat feeble explanation that this moral badinage will help them to cultivate a commendably suspicious attitude when thrown among strangers and others who might try to impose on their innocence, is received with a sniff and a delicate shrug of a smooth but eloquent shoulder. Usually she holds herself in ladylike restraint until the last moment when I have my hand on the handle of the door. Then her curiosity comes to the surface like a cork and in ringing tones she asks me where am I going.

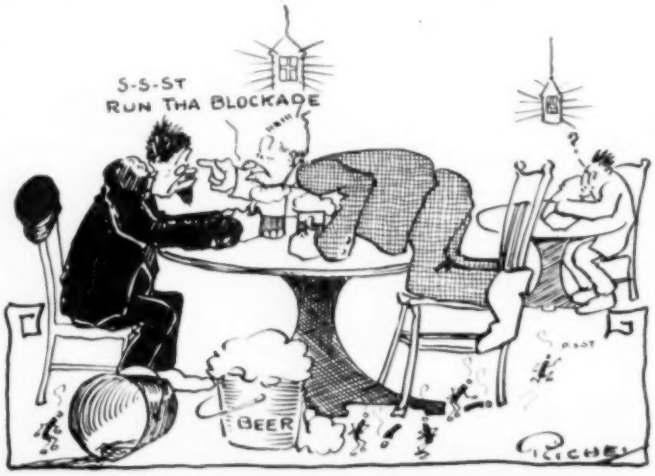
She does not wonder why I can't stay home at night, or will I be home for breakfast, or will I leave a forwarding address or any of the other hundred and one clever remarks by which the ladies in our best sellers are supposed to keep their slaves toeing the mark. That line of conversation lends an air of snappiness to the printed page, but in real life it is closely related to dynamite. The average slave usually carries a length or two of fuse within easy reach and some of them are right careless in applying the match.

In the present instance and in answer to her matter of fact question I told her I was going over to Bill's house. Barring strikes, fires, accidents, the will of God and other dispensations of providence she confidently might expect to see my cheerful countenance again about the hour of 10 or four bells in the dog watch.

"I guess dog watch is about right," said she. "You will go over there and sit for an hour listening to that old reprobate talking about the foundry. His language at times is shocking, he smokes the vilest tobacco and he monopolizes the conversation. Why the last time I was over there—"

I did not wait to hear what happened the last time she was over there. Curiosity, I am happy to say —at least along certain lines—never can be charged to my account. Also, I felt reasonably certain I should hear the remainder of the story on my return. Certain household experiences may be postponed, but not entirely averted.

Usually, I find Bill lightly clad sitting on the veranda with his stockinged feet gracefully disposed on the railing. Usually, also, he is engaged in no more strenuous occupation than that involved in puffing huge clouds of smoke from an old pipe and spitting dexterously at periodic intervals between the upright supports of the same railing. On this particular occasion I found him in the usual position, but he had a writing pad balanced on one knee and the corner of his mouth was black from frequent insertion of the end of a little stubby lead pencil. To my mildly surprised inquiry he replied, with well stimulated carelessness, that he was just



STRICTLY PRIVATE AND BEERY CONFIDENTIAL

trying his hand at writing a few scenarios for the movies.

"Up to the present," said Bill, "a natural feeling of delicacy and, I trust, a commendably modest disposition, have restrained me from essaying a flight into the field of the silent drama. Not as an actor. No, no! I have been pushed at times to wrestle with the wolf, but really there is a limit." Loud cheers from the present writer. "A conviction has been growing in my mind for some time that the character of the pictures has been deteriorating steadily. Clearly this is the time for all good men and true to rally to the support of the party. No longer should we content ourselves with the subordinate role of coughing up two bits on Mon., Thurs., and Sat., of this week and gazing with silent or vociferous approval, according to our nature, on the style of pictures presented. Without peradventure of a doubt it is up to us as hundred per centers to see that the programs are at least up to 50 per cent of what we have been led to expect."

JAZZING THE OLD STORY UP TO DATE

Before I could tell him that in my opinion we should shoot for at least 75 or 80 per cent he swept right along.

"I have particular reference to pictures based on themes of historical interest. Almost without exception the authors of these scenarios grossly have exaggerated and distorted the characters and the sequence of events. One man's guess is as good as another's, but I doubt seriously whether flappers in 1925 costumes fox trotted at the court of Queen Elizabeth as I have seen them in recent films. Understand, I was not there at the time, but I am not alone in this respect. I have certain reasons which will be forwarded on receipt of a self-addressed, stamped envelope together with one dollar in currency, check, draft or postal money order—do not send silver—I have certain reasons for believing that all the members of the merry party who clustered around Elizabeth, have been quite dead for a real respectable period of time."

While Bill was drawing a fresh breath I remarked sadly that his observations were true, quite true. I also suggested that this would be a good place to slip in some touching reference to quaffing the nut brown ale from the sterling old foaming beakers. Bill ignored these friendly suggestions. In fact he was so wrapped up in his subject that I doubt if he heard me.

"If we are to preserve the stream of history unpolluted," said he, "we must safeguard the source, particularly for the rising generation, the dear little kids and kidlets whose nimble and precocious minds are contaminated so easily. For example the picture of Nero in a top hat and a swallow tail coat tearing off a bit of jazz on a stradivarius will persist through prep school and college and effectually will prevent and nullify the well-meant efforts of any prof who attempts the practically impossible task of pounding the rudiments of Caesar's Commentaries into a vacuum. Certain members of the rising generation may scoff at the idea of attaching any importance to a knowledge of the Commentaries, but to these I say Pish, likewise Bah! That simply is begging the question. If Caesar did not expect to have his Commentaries read, why did he write them?"

I told Bill at this point that he might search me. I had not read them for many years and my recollection of them was exceedingly dim. In fact I was minded to borrow one of his own phrases and ask him who was this gink Caesar? Didnt he have any last name?

"Listen," said Bill. "I wish you would keep still. Stick up your long, sharp ears while I try to spill a few drops of wisdom into them. Realizing the importance of this subject and the danger of this insidious menace which hangs heavy, heavy over our heads I have been tempted to enter the lists and to run a course or two with sharpened lance against these perfidious scenario writers. 'Sdeath! Ill push their craven stories down their gullets and jam their front teeth down after them!

"For purpose of illustration I submit the following brief synopsis of an episode which has thrilled millions of readers in early school days. It contains all the necessary features which go to the making of a truly great picture. Heart interest, mystery, patriotism, action and suspense leading up to a smashing climax that is calculated to send the spectators home in a state bordering on intoxication. I expect it will prove a regular *WOW* when it is released by the Notorious-Slayers Combination.

CASABIANCA

CAST OF CHARACTERS

Cas, himself.....Chas. Ray
The Admiral, his father
....Doug Fairbanks
Mary Anne, his fiance....
.....Louise Fazenda
Pierre, the renegade.....
.....Wallace Beery
Jerry, the gob.....
.....Ben Turpin

More gobs, goblets, goboons, by Gobo, gobwebs, goblins, gobblers, right and left bowers, splice the main brace and let go the sheet anchor.

"In a gilded den of iniquity in old Cairo the admiral meets Jerry, a wealthy rum runner whose eyes are slightly out of plumb from leading a double life. To throw his pursuers off the track Jerry is masquerading as a true son of dear old Neptune and every day in every way gives an exhibition of shooting the bull to substantiate his claim that he is a gunner's mate. Over a bucket of suds he grows confidential and persuades the admiral to run the blockade with a view of taking him back to God's country where his customers are slowly dying in the agonies of thirst. 'Voila!' says the ad. 'Let's go!'

"The renegade pretending to be sleeping at a nearby table hears the plot. He sneaks down to the wharf and smuggles himself aboard the admiral's vessel before the remainder of the party arrives. With all lights doused, with half the crew soused and singing Yo-ho-ho and a bottle of rum the daring little vessel starts to slip quietly toward the harbor bar. Suddenly she is enveloped in the blinding glare of a search light and immediately afterward a hot shot from a patrol boat zips through her booby hatch and spills the beans.

"Instantly all is confusion. Chas, as usual, trips over everything in-

cluding the galley stove which sets the vessel afire. The renegade seizes the papers and jumps into the jolly boat which promptly sinks and leaves him to drown in a great mess of bubbles. The admiral and Ben fly away in an aeroplane and the heroine is rescued by the gallant young lieutenant who recognizes her as an old childhood sweetheart from Hoquendauqua, Pa.

"Chas, attired in the faithful old overalls and with his toes turned in, dances around the deck, but fortunately is too green to burn. After the fire has spent itself he paddles the wreck to shore where he sells it to a junkman and with the proceeds he pays off the mortgage on the old homestead.

And So With the Coming of a New Day All Is Quiet Along the Potomac.'

"There y'are," said Bill, beaming with the justifiable pride of an honest artizan who has turned out a creditable piece of work. "If I do say it as shouldn't, that is about as catchy a thing as you will see along the Rialto on any long summer day. I intend to show it to the little woman who is my best pal and severest critic—in the usual ratio of 1 to 10—but according to the time honored custom of trying it on the dog first I shall appreciate your honest opinion, if you have one, before I submit it to the board of final appeal."

While deprecating the style of language in which he had seen fit to couch his appeal I had to admit that the scenario had all the earmarks of a winner. It was composed strictly according to stock specifications and doubtless would appeal strongly to the average movie fan who wants neither logic nor sequence in the stories that are unfolded for his edification.

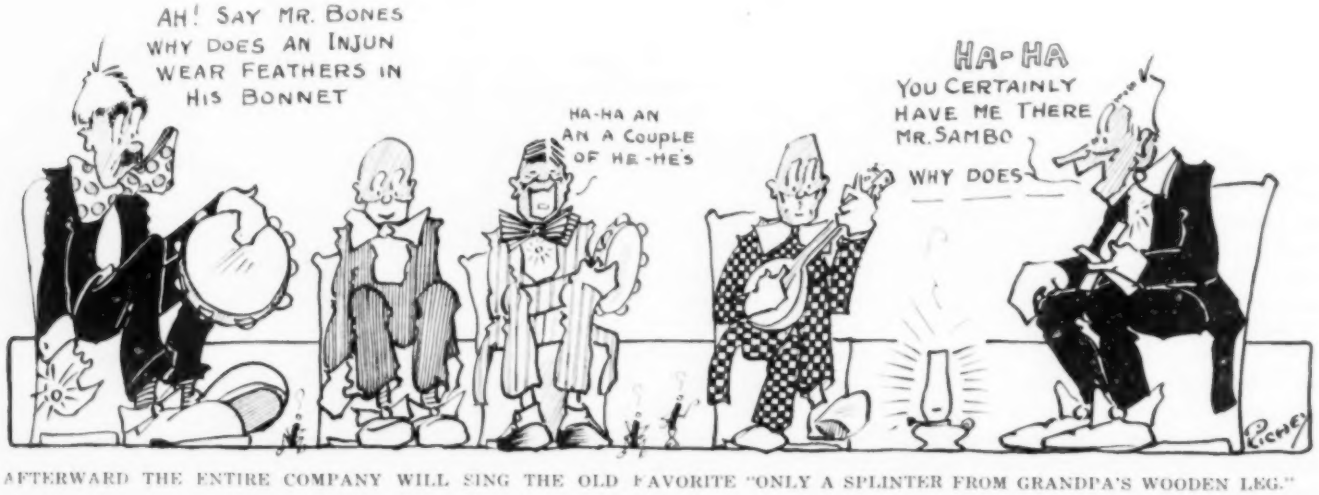
"Well," said Bill. "I'll tell you. Some of the men engaged in the foundry business are just as much at sea in regard to certain factors vitally affecting their welfare as the nuts who applaud a piffly picture. Some one tells them a fairy story about another foundry and they believe it implicitly without taking the least trouble to investigate the circumstances. One foundry owner knows that his good castings only approximate 65 per cent of the amount of iron charged in the cupola. He hears of another foundry in which the return of good castings is 80 per cent of the iron charged. He immediately rises up on his hind legs and howls. If he is of the irascible type he grabs his trusty tomahawk and lops the superintendent's name from the payroll.

"You might just as well attempt to supply a definite answer to the old conundrum, 'How long is a piece of string?' as to lay down a definite figure and claim arbitrarily that it represents the proper percentage of iron loss in foundry practice. The loss is based on four items, defective castings, gates, over iron and furnace loss. These four factors are variables and depend to a great extent on the character of the castings, the shop equipment, the class of labor available and the knowledge or lack of knowledge as the case may be on the part of the person who purchases materials. Out of all these the only factor that remains fairly constant is the furnace loss and that will range between 5 and 10 per cent, depending on whether the charge is made up of pig iron or of light scrap. Consider the other three factors in the order indicated: Defective castings, gates and over iron. Under exceptional circumstances, plain work, skilled molders, hot iron, good sand and no rush, the percentage of loss from defective castings over a month's operation may be as low as 2 per cent. On intricate castings, semi-skilled or green men, dull iron, poor sand or sand improperly mixed, the loss from defective castings may exceed 50 per cent. In the average jobbing foundry operated intelligently under normal conditions the loss from defective castings should not exceed 5 per cent.

"The amount of iron required for gates runners and risers will depend on the size and shape of the castings. In light casting shops the proportion usually is 50-50. That is the cleaned castings only weigh half as much as the iron charged into the cupola. Where all the castings are unusually heavy the amount of iron required to fill the gates may not amount to 1 per cent. In the ordinary small and medium sized jobbing foundry the amount will vary between 5 and 10 per cent.

"The amount of iron left over after the heat is governed entirely by the knowledge and skill of the foreman or whoever estimates the amount of iron required to pour off the floor. If he is thoroughly competent and has the necessary confidence in his ability, the amount of iron left over will be negligible. If he cannot calculate the correct amount, or if he is one of these cautious individuals always providing for contingencies or accidents that never happen, the amount of iron left over may approximate 5 per cent of the total amount melted.

"Briefly it may be stated that the ordinary jobbing foundry operating under normal conditions should show a yield of 80 per cent good castings. The 80 per cent representing the proportion by weight of the iron charged into the cupola. The remainder, or 20 per cent loss, will be distributed as follows: Defective castings 5 per cent; gates, runners, spills, etc., 10 per cent; furnace loss 5 per cent."


AH! SAY MR. BONES WHY DOES AN INJUN WEAR FEATHERS IN HIS BONNET
HA-HA AN AN A COUPLE OF HE-HE'S
HA-HA YOU CERTAINLY HAVE ME THERE MR. SAMBO WHY DOES

AFTERWARD THE ENTIRE COMPANY WILL SING THE OLD FAVORITE "ONLY A SPLINTER FROM GRANDPA'S WOODEN LEG."

"I trust," I interrupted at this point, "that you will pardon me for deflecting the current of your thoughts, but your reference to conundrums, howls and tomahawks reminds me that I recently heard a rather jolly wheeze based upon one of the well known idiosyncrasies of the aborigine or red man of North America. Why does an Indian wear feathers in his hair?"

"Ah, ha! Mr. Bones," said Bill in his imitation of the minstrel-boy-to-the-war-has-gone tone. "You certainly have me there. I must confess I have not the slightest idea. Now, tell me, Mr. Bones, why does an Indian wear feathers in his hair?"

"An Indian wears feathers in his hair," I said, edging cautiously toward the top step of the veranda from which I could jump at a moment's notice. "An Indian wears feathers in his hair to keep his wig wam!"

B. A. Lanza will remain in charge of Columbus office of Reuben H. Donnelly Corp. This office was recently moved from Cleveland to 39 West Broad street, Columbus, O.

Recommend Size Reduction in Piston Rings

Reduction in sizes and dimensions of piston rings for automobile motors is urged by the ring manufacturers to eliminate waste in the production and distribution of these commodities. Firms interested have requested the co-operation of the division of simplified practice of the U. S. department of commerce in their efforts to rid themselves of the burdens now imposed on them by the huge assortment of sizes which the manufacturers carry to serve the motoring public.

Some manufacturers produce from 3000 to 8000 sizes. These include the so-called regular sizes, and also a line of oversizes for use with re-bored cylinders. With this great variety, it is pointed out, the manufacturers must keep on hand total stocks aggregating 3 to 5 million rings to give adequate service to the trade. Some of the sizes, though seemingly necessary from a service standpoint, seldom are sought by the car builder. This results in slow turnover, heavier carrying charge for these large inventories, including interest on idle investment, depreciation, and obsolescence, with consequently greater costs of doing business. Prices to the ultimate consumer are proportionately higher under these conditions of excessive variety than would be necessary if fewer sizes and dimensions were acceptable to the engine and motor car builders.

Ring manufacturers recognize that the initial corrective effort must come from the engine designers and builders, and many of the engineers are in sympathy with the idea of fewer sizes as evidenced by the suggestions regarding desirable simplifications recently made by the members of the American Society of Mechanical Engineers to the American Engineering Standards committee and relayed by that body to the division of simplified practice.

Linde Air Products Co., New York, manufacturer and distributor of oxygen for cutting and welding, has changed its district office at Seattle to 421 Railway Exchange building. O. H. Davenport is district sales manager.

Heat Treating Malleable Castings Prior to Galvanizing

IN AN article presented in an early 1925 issued of *Industrial Gas*, Milton Epstein, LaClede Gas Light Co., St. Louis, discusses a process, which recently was developed by the bureau of standards, for heat treating malleable cast iron. This process applies only to castings which later are to be galvanized; through its use castings to the amount of 10 to 20 per cent of the production which formerly were rejected now are saved. It has been found that the galvanizing of malleable castings has a deteriorating effect on them particularly as regards the effect of galvanizing on the brittleness of the iron. They only have a fraction of their original impact strength. This decrease in impact strength is a result of the heat treatment which the castings receive in the galvanizing bath. The castings when dipped in the molten zinc and brought up to the galvanizing temperature undergo structural changes which account for the loss in their resistance against impact.

Until recently this embrittlement was considered to be a necessary concomitant of the galvanizing operation. Manufacturers regarded the rejection of 10 to 20 per cent of their galvanized castings as a required expense of this process. No attempt was made to explain or prevent this phenomenon of the embrittlement.

The bureau of standards in its technologic paper No. 245, entitled "Embrittlement of Malleable Cast Iron Resulting from Heat Treatment," describes its efforts to devise some means of eliminating this undesirable effect. Studies were made of the following factors:

1. Rate of heating.
2. Time at galvanizing temperature, 860 degrees Fahr.
3. Rate of cooling.
4. Ageing of casting after cooling.
5. Effect of varying the quenching temperature.

The factor which leads to the successful solution of this problem is the last mentioned. A series of experiments was carried out in which the original malleable castings were heated to va-

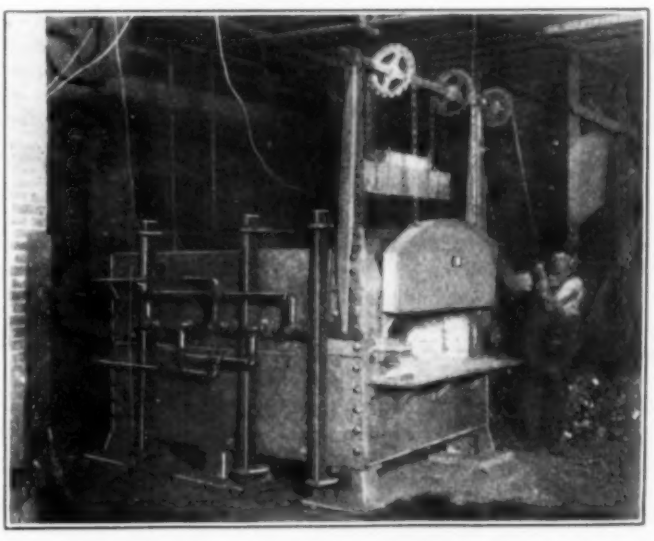


FIG. 1—EQUIPMENT USED IN NEW HEAT TREATING PROCESS FOR MALLEABLE CASTINGS

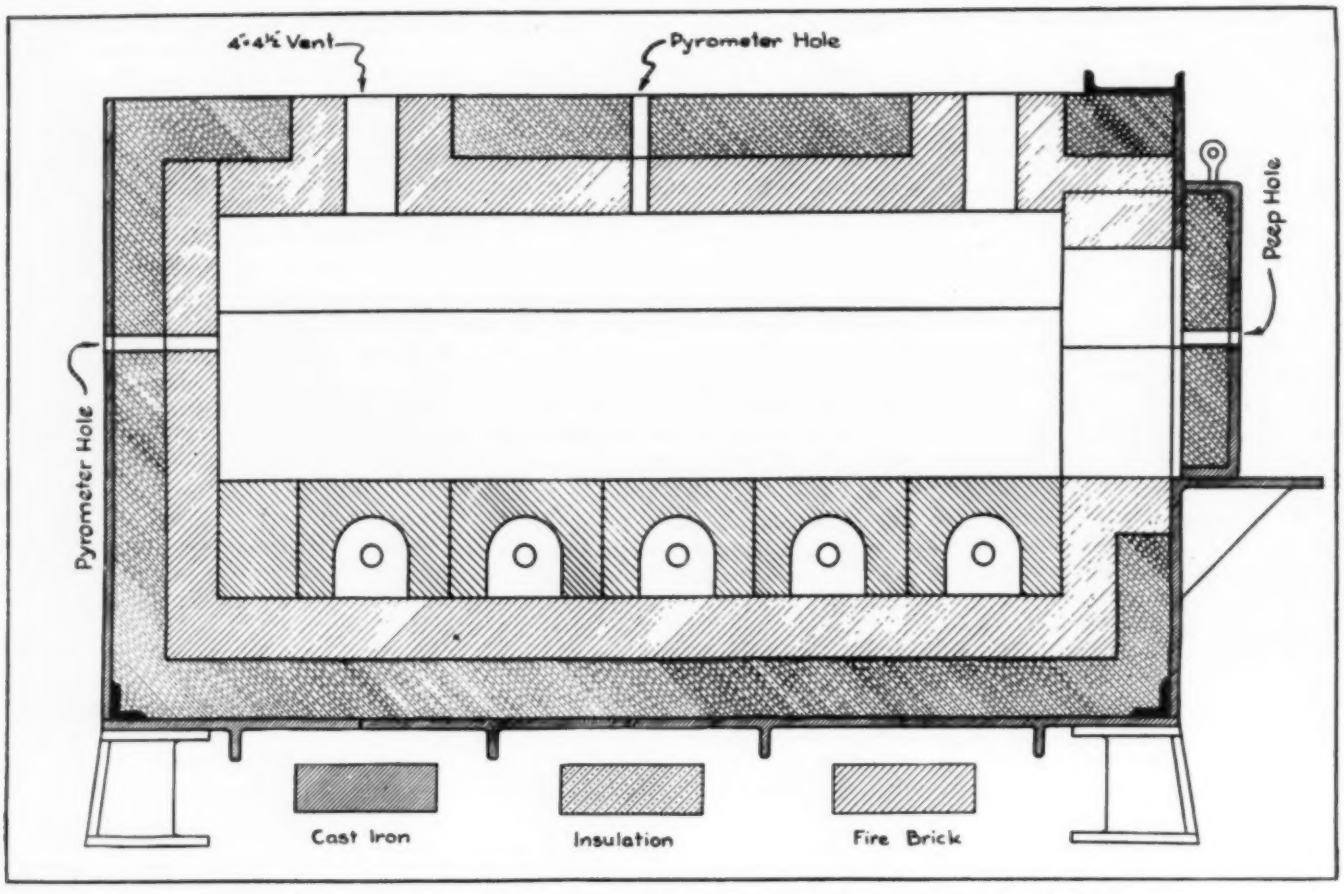


FIG. 2—CROSS SECTION OF HEAT TREATING FURNACE USED FOR PREPARING MALLEABLE CASTINGS FOR GALVANIZING PROCESS

rious temperatures and quenched. From the results of these experiments it then was clearly demonstrated that castings which are quenched from 860 degrees Fahr. have only 11 per cent of their original impact value. Upon raising this quenching temperature, however, to 1135 degrees Fahr., the castings have 152 per cent of the original impact value, and upon further raising it to 1472 degrees Fahr. the relative impact value while decreasing still is greater than the original value.

From these experiments the following heat treating process was evolved. Malleable castings which are subsequently to be galvanized are heated to about 1200 degrees Fahr. and quenched in water. These then are galvanized in the regular manner. Specimens treated in this way show impact value of about 140 per cent of the original value.

Possibly the first commercial furnace for this operation recently was installed by the St. Louis Malleable Casting Co. This furnace is well constructed, fully insulated and completely enclosed in a substantial cast iron casing. A feature that deserves special mention is the hearth construction. Instead of providing a full hearth as is the usual practice in this type of furnace, two piers each 6 inches wide, were installed the full length of the furnace. These piers serve the double purpose of supporting the boxes and at the same time elevating them about 10 inches above the furnace floor.

Thus the boxes containing the castings receive bottom heating as well as side and top heating. The piers are constructed of special fire brick shapes and contain openings, which are in line with the hot flue gases along the furnace floor.

The firing equipment consists of standard surface combustion burners used in connection with high-pressure gas. The burners on one side fire through the piers which support the boxes and on the other side fire directly under the arch.

This furnace is operated much after the fashion of those used for the ordinary carburizing process. The work is piled loosely in cast-iron boxes. The boxes are ⅜-inch thick and are perforated on the bottom and sides to allow the flue gases a free circulation through the castings. Two boxes serve to carry a charge of 450 to 500 pounds. When a load is up to heat it is removed from the furnace by a long fork which engages it through special fittings provided in its sides. The box thus is transported to the quenching bath, where it is turned over by the aid of the fork. The castings drop in the bath and the box is retained by the fork. Each box is filled immediately with a new charge and while still hot, is replaced in the furnace. Normally 10 minutes are required for quenching and charging.

After the furnace is up to heat about 45 minutes is required to bring a charge to the desired temperature. Five thousands pounds of castings can be heat treated per ten hour day with a gas consumption of 3500 cubic feet per ton.

The following illustrates clearly the marked decrease in the impact value that is caused by the galvanizing of malleable cast iron:

	Mean Impact Value	
	Energy absorbed	Relative value,
Treatment	ft. lb.	%
Malleable casting, untreated....	7.2	1.00
Galvanized at 860° Fahr., quenched	0.9	12

The accompanying illustrations are presented through the courtesy of *Industrial Gas.*

Walter Harnischfeger, vice president of the Harnischfeger Corp., Milwaukee, accompanied by Mrs. Harnischfeger sailed Sept. 3 for South America. They will be absent about two months.

Skimmer Core Reduces Steel Foundry Losses

By J. H. Crawley

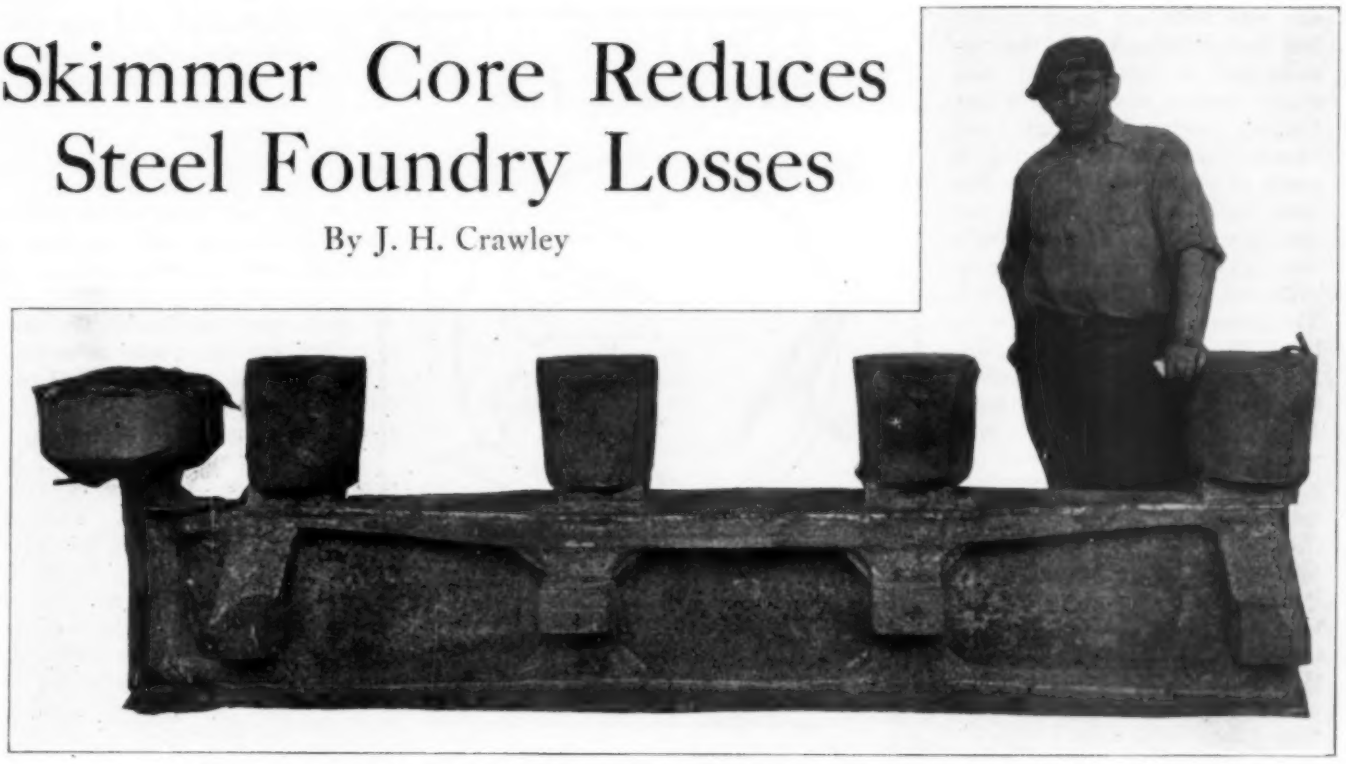


Fig. 1—Illustrating the use of the skimmer on a runner for a steel casting weighing 3500 pounds

MANAGERS, metallurgists, foremen and others have been making some progress for a number of years on the casting loss problems. No one in the foundry industry likes to make scrap. The loss runs into millions of dollars annually, and the arguments over lost work lead to harsh words which are the cause of much ill will. This loss means a large turn over and while none of us want to make scrap castings still we get them.

Can we get all good castings? I doubt if we ever will get to such a state of perfection but at least we could do 50 per cent better than we are doing at present if enough interest could be aroused in the saving.

A scrap casting is evidence that some one has blundered. It may be the draftsman, the patternmaker, manager, superintendent, foreman, or molder and these blunders cost millions of dollars yearly in this countdy.

Co-operation—that word we hear so often and put into practice so little—between the drafting room, the pattern shop, and the foundry would cut down the percentage of scrap castings. Many castings are designed and made without consulting the foundryman. Blame for this tremendous waste usually is placed, although unjustly, on the foundry or ganization. If the casting is designed correctly, the pattern made with the idea of getting clean machined surfaces, the mold split and cored properly; the job will have a good beginning. With a right beginning it is to be expected that the foundry

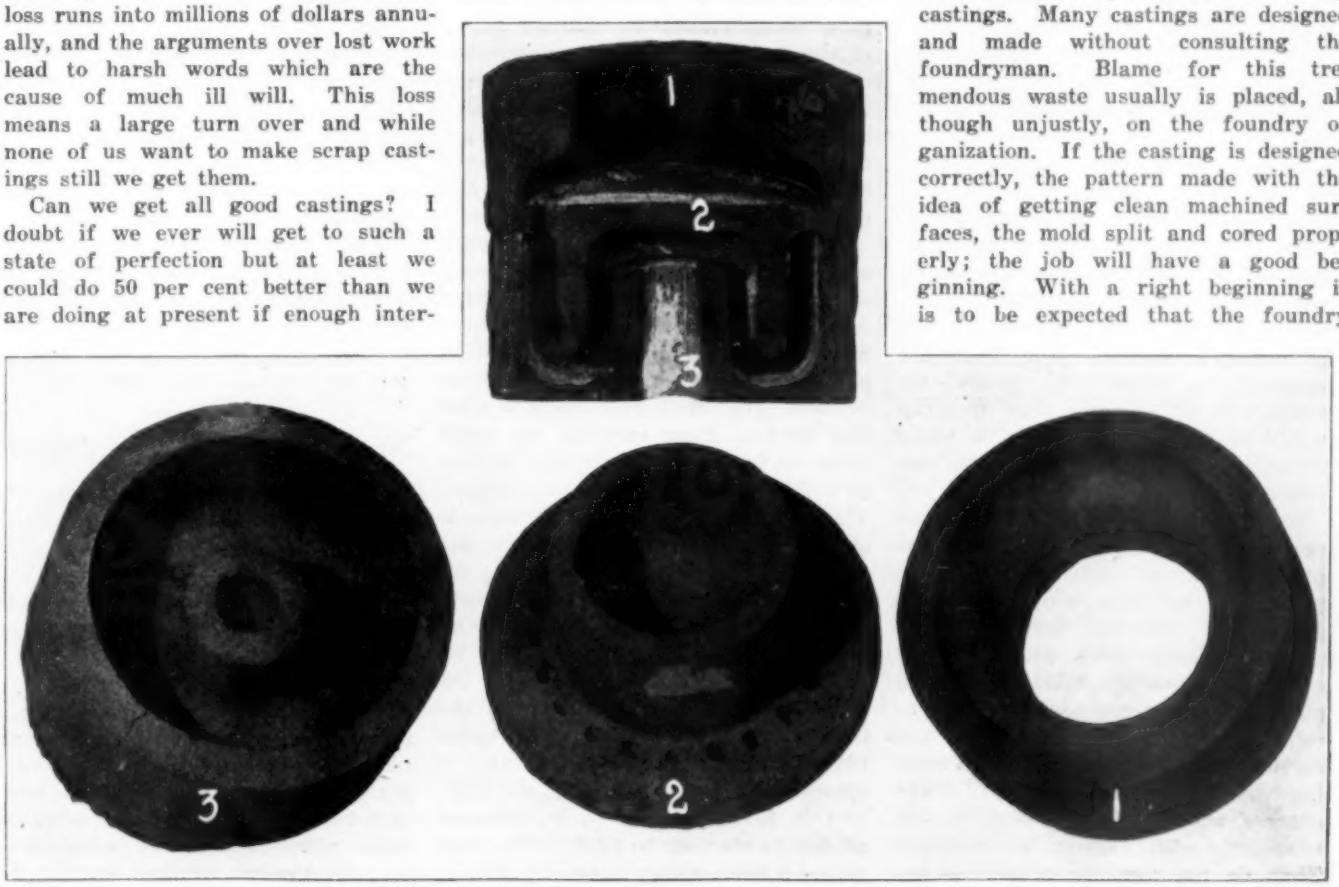


FIG. 2—THE THREE COMPONENT PARTS OF THE SKIMMER CORE ARE SHOWN IN THE LOWER PART OF THE ILLUSTRATION WITH A SECTION SHOWING THE GENERAL ASSEMBLY IMMEDIATELY ABOVE

Faked Foundry Facts

A Machine Operator

can and will get good results but how disappointing the results are in many cases! Too many chances are taken in the foundry today although the foundry business is not such a game of chance as it was. We have made rapid strides in the past few years and many problems have been solved, still many problems remain to be solved. The foundry slogan appears to be: I'll take a chance! The foreman takes a chance when he uses materials that have been purchased by guess. Why not have all materials such as pig iron, scrap, coke, binders, sand, etc., tested? See that they conform to definite specifications. Check the other fellow up occasionally. Do not try to patronize every salesman that comes your way. Purchase right materials not by guess but by analysis. Bear in mind that the best materials can be ruined by poor foundry practice. For example, pig iron can be ruined by incorrect cupola practice, coke may be condemned by the iron charges being too small or too large, or in the way it is charged in the cupola. Nevertheless if you have purchased the best materials for your line of work you have safe-guarded yourself against excessive scrap losses.

With correct melting conditions and materials of the right analysis no trouble can be blamed on the metal, and scrap from this cause will be kept at a minimum. Many foremen do not realize the importance of hot metal and frequently will pour work with cold sluggish metal. When the casting is machined they frequently place the blame for the result on the mold instead of on the metal. Do not take a chance. The odds are against the man who pours his metal cold. The percentage of scrap would be lowered materially on many classes of castings if the work was poured with hot metal.

Even with materials of correct analysis, good cupola practice, good pouring practice and hot metal the results are not always up to our expectations. Castings will come out strained, scabby, dirty, with cores out of place, showing shrink holes and many other defects too numerous to mention, the result of blunders and carelessness. No one will lose a casting purposely but men will take chances with wet sand, hard or soft ramming, with clamps or weights. They do not vent it or fail to secure the core properly. They do not lift the cope to examine for a crush. All these things mean scrap castings.

For years foundrymen have been familiar with the use of skim gates on molds for iron castings. The object of a skim gate is to keep any dirt, slag or other foreign matter from entering the mold while the metal is being poured. A skim gate may consist of a perforated metal plate which resists the melting action of the molten metal for a short time until the metal has had time to partially fill the mold; a skim gate also may be constructed by so arranging the gate channel that the dirt or slag floats to the top of this channel and thus is kept from entering the mold.

To the author's knowledge no serious effort has been made to devise a skim gate for steel. Steel is poured from the ladle into the mold in three ways; over the lip, through a tea pot spout, or through a nozzle in the bottom. In the first method the slag is kept from entering the mold more or less successfully by the use of a skimmer manipulated by a helper. The success of this method depends on the skill and alertness of the helper. At best it never prevents all the slag from entering the mold. Sometimes the slag is held back by placing a brick or core at the lip of the ladle. In a tea pot ladle the metal is taken from the bottom of the ladle as from a regular tea or coffee pot. More or less slag always is presented in the spout when the ladle first is filled and has to be skimmed off before starting to pour. This type of ladle while better than the first is not a positive insurance against slag entering the mold. With a bottom pour ladle much less slag enters the mold that from either of the other two. There is a chance of the ladle lining fusing and entering the mold but this source of impurity causes little trouble. A skim gate for steel shown in Fig. 2 has been found effective in preventing the entrance of slag, dirt or other foreign material into the mold when pouring over the lip of the ladle. This skin is made in a three-part core and is placed over the gate of the mold and the metal poured directly into it. It has been used on steel, iron and bronze castings, and has been found effective. While using this device it is not necessary to skim the slag off the metal in the ladle as it is impossible for the slag to enter the mold when the skim gate is kept filled. The device can be made in various sizes for different quantities of metal and different size castings.

In the casting shown in Fig. 1 trouble was experienced in obtaining a clean cope surface. This casting weighs 3500 pounds. The mold is made entirely from cores and it is perfectly clean at the time of pouring. Formerly when pouring over the lip with the tea pot ladle this casting almost invariably showed slag on the cope surface after machining. Since the skim gate has been used this casting comes out entirely free from slag on the cope surface. In fact no welding has been done on any of these castings since the skim gate was employed.

Although this pouring basin is not a cure-all for foundry defects, still it is a step in the right direction and if used with common sense will save a large percentage of castings now lost through slag and dirt.

New Catalog Facilitates Equipment Buying

Catalogs are necessary adjuncts to every modern manufacturing plant or office, and the new catalog being distributed by Whiting Corp., Harvey, Ill., is exceptionally interesting and complete.

The catalog is the loose leaf type and lists all foundry equipment manufactured by the company. The different sections are composed of separate catalogs bound with heavy paper. Each section has a thumb index which makes the selection of any particular section easy. The catalog is printed on a heavy grade of paper in easy-readable type.

Ohio Foundrymen Consider

Problems of

Sand, Employe Training and Taxation

SAND is uppermost in the minds of foundrymen, if the evidence of attendance and interest at sessions of the Ohio State Foundrymen's association may be taken as a measure. In response to requests, the program committee again scheduled an address by E. S. Carman, chief engineer Osborn Mfg. Co., Cleveland, similar to that which was given at the meeting of the society in Cleveland last year.

WALTER L. SEELBACH

EDUCATED in the schools of Cleveland, Walter L. Seelbach, newly elected president of the Ohio State Foundrymen's association, was graduated from Case College of Applied Science with a degree in civil engineering in 1910. Immediately upon leaving school, Mr. Seelbach became associated with the Walworth Run Foundry Co. of which organization he is secretary-treasurer. He also is vice president of the Forest City Foundry & Mfg. Co., Cleveland, and is identified with local industrial activities.

The importance of sand in relation to the reduction in loss of castings in the foundry industry is shown by statistics compiled by Mr. Carman. He listed the causes of castings losses as being chiefly slag and gas, with the probability that those defects attributed to slag may in fact be traced to sand. The accompanying Table I shows the value of castings made in 1923, according to the department of commerce. This shows that with an average loss of 10 per cent, the value of scrap castings totals more than $57,000,000 a year. Computing the loss due directly or indirectly to sand as 55 per cent of the total, the bill against poor or unsuitable sand is $31,487,500. To this Mr. Carman adds 50 per cent of the cost of sand used to produce these scrap castings which might be saved by proper sand treatment and gets the grand total of $44,937,500 wasted and chargeable to the loss account of sand, Table II.

The speaker recommends some radical departures from accepted practice. He does not favor the use of one quality of sand for facing and another for backing, showing that the process of ramming leaves portions of the pattern uncovered by the facing, and creates alternate free venting and dense portions. He urges greater uniformity, deprecates the practice of venting by the use of the vent wire and advises less moisture.

He concluded his address by showing and describing a number of slides illustrating the points in question and covering continuous molding systems recently designed and built by his company. These include sand conditioning, elevating, flask filling, molding, and shakeout units. One such installation is in service at the plant of the Dayton Steel Castings Co., Dayton, O., and was described in THE FOUNDRY of May 15, 1925.

New Officers Chosen

PRESIDENT

Walter Seelbach, Walworth Run Foundry Co., Cleveland

VICE PRESIDENT

C. C. Smith, Toledo Steel Castings Co., Toledo

TREASURER

Edward Sands, Superior Gas Engine Co., Springfield

SECRETARY

A. J. Tuscany, Cleveland

DIRECTORS

Walter Seelbach, Walworth Run Foundry Co., Cleveland; **Frank W. Huber**, American Rolling Mill Co., Middletown; **George W. Piehl**, Wessling Brothers Foundry Co., Cincinnati; **L. H. Wise**, H. V. Dockray Brass & Iron Co., Zanesville; **W. D. Anglemeyer**, Star Foundry Co., Troy.

Meet Two Days

The convention of the Ohio State Foundrymen's association, which was the fifth of its existence, occupied two days, the sessions being held at Cedar Point, O. The first day was devoted to a business meeting with reports of the officers and important working committees. In the evening of the first day an informal dinner was held and the members and guests were addressed by Malcolm Jennings, Ohio Manufacturers' association on the closing days of President Harding's life. Robert Crawford, Atlas Foundry Co., Detroit, and president of that city's foundrymen's association, outlined the early plans for entertaining the American Foundrymen's association convention and international meeting in Detroit next year.

C. C. SMITH

WHEN he cast his lot in foundry lines, C. C. Smith, recently elected vice president of the Ohio State Foundrymen's association, was not fickle in his business connections. He started to work for the Toledo Steel Casting Co., Toledo, more than 22 years ago. His first employment was as pattern clerk. Later he worked in various positions including that of assistant manager. At present he is secretary-treasurer of that organization and finds time to be active in steel foundry association work.

The technical sessions were held Friday morning, Sept. 4, and these terminated in a round table luncheon. Tables were provided where the members were grouped to take part in various subjects including costs, electric furnaces, sand, employe training and legislation. The leaders of these

various discussions were as follows: Costs, E. T. Runge, Cleveland, cost advisor of the association; electric furnaces, W. B. Wallis, Pittsburgh Electric Furnace Corp., Pittsburgh; foundry sand, E. S. Carman, Osborn Mfg. Co., Cleveland; employe training, L. A. Hartley, director of education, National Founders' association, Chicago; legislation, Emil E. Watson, consulting actuary, Columbus.

Must Train Men

Employe training is one of the most important and perplexing problems engaging the attention of manufacturers, and particularly foundrymen today, according to an address by L. A. Hartley, director of education, National Founders' association, delivered at the technical session Friday morning. An increase of but 15 per cent in the present rate of operation would see a labor shortage, according to a survey prepared by the speaker. Charts were offered to show that the majority of skilled foundry workers today are in the upper age group, ranging from 25 years of age upward, while the death curve of the personnel of this industry rises rapidly through the last 25 per cent of those employed as foundry workers. Europe, no longer, can be drawn upon to supply the deficit in labor for foundries and the average public trade school does not provide workmen for this industry.

Mr. Hartley outlined the work which is being done to train American youth to take up the work of the foundry industry. He referred briefly to the systems of vocational training in Milwaukee, Waynesboro, Pa., in San Francisco and in various individual plants. The Milwaukee district plan was described in THE FOUNDRY of Oct. 1, 1924.

Taxes Pyramiding

Legislation and its influence upon the industrial life of the state and nation as presented in a second address by Malcolm Jennings, drew the attention of the Ohio State Foundrymen's association at the opening of its technical sessions, Friday morning, Sept. 1, to the increasing taxes which threaten to absorb the available capital of the nation now engaged in industry. He cited comparisons between the present and 15 years ago to show the change in the public attitude toward the spending of tax funds. In 1912 Ohio defeated a proposal to expend a million dollars on roadways. This year the state is spending 27 millions on highways without any appreciable public objection.

Similarly, the freedom with which counties, townships and municipalities make public expenditures has undergone expansion, while school extension affords a constant outlet for moneys raised by various forms of taxation. He cited the development in expenditures for various teaching needs, the employment of special school architectural talent, and the manner in which schools even of the central character such as high schools are located upon high priced real estate.

He recommends as measures to limit this reckless spending of moneys with the attendant increase of taxation, certain reforms in the basis of corporate taxation. He advises the limitation of outlay to the amount of available levies and the issue of bonds to mature within the life of the improvements contemplated.

Sails for Japan

G. H. Bucher, assistant general manager of the Westinghouse Electric International Co., has sailed for Japan, via Seattle, and will assist in the organization of the newly formed Westinghouse Electric Co. of Japan. He also will visit China and the Philippine Islands.

The department of commerce received reports from 343 plants manufacturing stoves and hot air furnaces for the year 1923, 46 of which are located in Illinois.

Will Build Eastern Pipe Foundry

R. D. Wood & Co., 400 Chestnut street, Philadelphia, plan the construction of a plant at Florence, N. J., to manufacture centrifugal pipe in sand molds. This process which consists of introducing a predetermined amount of molten iron into a hollow sand mold, which is rotated at high speed causing the metal to form a hollow pipe without a core, has been called the *sand spun* process. The new foundry contemplated by R. D. Wood & Co. will have a capacity of 400 tons per day. This with a plant now being erected by the American Cast Iron Pipe Co., Birmingham, will increase the capacity of the country for manufacturing this class of pipe to 900 tons per day.

Experimental work tending to the perfection of this process has been carried on for a number of years by the American Cast Iron Pipe Co. Associated with this company on the development work are a number of other manufacturers, among whom are said to be R. D. Wood & Co., Warren Foundry & Pipe Co., Phillipsburg, N. J., Donaldson Iron Co., Emaus, Pa., and Lynchburg Foundry Co. and Glamorgan Pipe & Foundry Co., both of Lynchburg, Va.

Table I

Computed Value of Scrap Castings

Based on Department of Commerce Statistics, 1923

Value of Castings sold	$572,500,000
Average loss 10% of total	57,250,000
Loss due to sand, 55% of loss	31,487,500
Tonnage of Loss	
Total gross production figured from average price of 5 cents a pound from above	5,725,000
Saleable tonnage, 10% less	5,172,500
Scrap tonnage, 10%	572,500
Scrap loss due to sand 55% of loss	314,875

Table II

Added Sand Cost Due to Loss

Total sand cost on $4 a ton basis	$ 22,900,000
New sand cost for scrap produced on 10% loss basis	2,290,000
New sand used, chargeable to scrap from sand causes, 55%	1,259,500
25% saving in new sand	$ 5,725,000
50% saving in new sand	11,450,000

Were it possible to eliminate all losses due to sand the saving in the price of castings would be $31,487,500. Adding to this the saving of 50% of the new sand previously used only to give scrap castings, $11,450,000 a saving of $44,937,500 would result.

Proceedings Available

The proceedings of the annual conference of the National Association of Office Managers are available through F. L. Rowland, secretary, Lincoln National Life Insurance Co., Ft. Wayne, Ind. The price of the publication is set at $2.

Producers of gray iron castings reported products valued at $154,928,568 according to data obtained by the department of commerce in its biennial census of manufacturers for 1923.

Sandblasting Castings *Prepares Surface For Finishing Process*

By Howard Orr

Ft. Wayne Works, General Electric Co.

SANDBLASTING is the discharging of an abrasive material, at high velocity, against the surface to be blasted or treated. The first requirement in producing a good finish on a piece of apparatus, structure, or part is a properly prepared surface on which to apply the desired finish. Among the various methods of preparing surfaces, sandblasting occupies a place of prominence.

The usefulness of sandblasting, when properly done, is seen in the removal of rust, scale, and foreign substances from castings or various shaped pieces made from cast iron, cast steel, malleable iron, sheet steel and forged steel. The result of the sandblasting operation produces a good surface for plating, painting, enameling, japanning and lacquering. Brass, bronze, aluminum and alloy castings, sheets and parts are sandblasted for the prime purpose of providing the proper surface for applying the finish.

Sandblasting is accomplished by discharging the abrasive through a nozzle at a high velocity by compressed air, the application varying to meet conditions and specific requirements. The compressed air is harnessed to discharge the abrasive by three general methods.

1. The direct pressure system.

In this system the air and the abrasive materials are combined in a sealed container and discharged from the bottom of the container through a hose, on the end of which is a nozzle; the discharge being at gage pressure or at the same pressure as in the container, thereby obtaining the highest possible velocity with a given opening in the nozzle. An installation of this kind together with patented refinements is commonly termed an open blast.

2. The suction system.

In the suction system the abrasive is mixed with the air in the nozzle by a suction formed by the compressed air, which is discharged through a nozzle or jet within the nozzle proper, the air carrying the abrasive with it. As the jet which discharges the compressed air into the nozzle is smaller than the nozzle, expansion takes place. Therefore, the discharge at the nozzle is at a lower pressure than the compressed air and results in decreased velocity of the abrasive. Installations of this type, together with patented refinements such as dust arrestors and devices for reclaiming and delivering the abrasive back to the nozzle commonly are termed gun blast.

3. The gravity system.

In the gravity system the abrasive material is carried mechanically to a place above the nozzle and then is fed by gravity into the nozzle, where it is combined with the compressed air and is discharged. The full force of the compressed air is given to the abrasive. Sandblasting barrels occasionally employ this system.

All sandblasting machines necessarily employ one of the three systems. Machines using steam employ these same principles. Dust arresters, mechanical conveyors for handling the abrasives, reclaimers and devices for handling the work being blasted have made most sandblasting machines semiautomatic and selfcontained.

The table blast is a semiautomatic and selfcontained blasting machine usually employing the direct pressure system. The direct pressure machine itself is located in a blasting chamber. A revolving table loaded with work to be blasted passes into this chamber which covers one-half of the table; the table being from 60 to 100 inches in diameter. The nozzles, usually two, are arranged so that the full width of the table is covered several times. This is accomplished by a mechanical movement of the nozzles. Usually each of the nozzles travels fast in a circle at right angles to the table. The revolving table is constructed of grating, thus allowing the abrasive to fall through to a hopper, where it is carried by the elevator to the separator. The abrasive is reclaimed by an elevator and a separator, the separator consisting of a series of screens or riddles which are vibrated mechanically, thus removing large particles and refuse, reclaiming the usable abrasive and discarding the worn out. The screens are interchangeable so that different sizes of abrasive may be used.

The dust arresters usually consist of a suction fan which exhausts the dust from the blast chamber, together with the fine disintegrated abrasive, and discharges them into an exhaust system. The exhaust system itself usually is discharged into a container for collecting the worn out abrasive and dust. The container is fitted with a series of special woven cloth baffles and a mechanical arrangement for shaking or jarring the dust from the baffles. Some installations are hooked directly to the main exhaust system which may either be a forced or an induced draft. The opening at the front of the blasting chamber is fitted with multiple curtains of heavy cloth or rubber thereby retaining the flying abrasive and dust and at the same time permitting the work on the table to enter the blasting chamber. The mixing chamber usually is a cast iron tank, heavily reinforced at wearing points, and provided with proper valves and connections for admitting the abrasive and air. This mixing tank may be located in the machine itself or at any convenient place adjacent to the machine. This tank also must be equipped with an outlet line carrying the abrasive and air to the nozzles. The abrasive usually is introduced into the tank by a hand operated valve, the feed being from a hopper. This hopper receives its supply of abrasive from the separator or is supplied when necessary with new abrasive by the operator. The air line feeding this mixing tank must be equipped with an oil and water sep-

arator as it absolutely is necessary to use clean, dry air.

Sandblast tables are built involving suction and gravity systems and various refinements and designs of the previously discussed principles are found in sandblast tables of various manufacturers. The sandblast table machine is used for work too large for barrel blasting. The table sandblast permits the turning of pieces individually on the exposed part of the table while the blasting continues within the chamber.

Uses Direct Pressure

The open or hose type blast employs the direct pressure system. The installation usually consists of a mixing tank and a separator; the mixing tank having the same functions as explained in the description of the table blast. The work is done on a grate under which is a hopper. The blasting is done by an operator directing the stream of abrasive upon the work at high velocity, discharged from a nozzle at the end of a flexible hose. The discharged abrasive falls through the grates into the hopper and is carried by the elevator to the separator, which employs the same principle as the elevator used on the table blast. Some installations of this type are housed in a special room and are equipped with air exhaust systems and dust arresters. These installations commonly are termed sand blast rooms. This type of blasting is adapted particularly to large, heavy work.

Equipment of this type also is used in a cabinet blasting machine. This installation consists of a steel cabinet entirely enclosing the blasting operation and confining the flying abrasive and dust. These cabinet type direct pressure machines often are equipped with a revolving table made of grating, one-half of which passes into the cabinet. The work to be blasted is loaded onto the exposed half of the table and the table is turned by the operator to bring the work within the blasting cabinet as required. The operator works in the open requiring no other protecting than that afforded by the cabinet. The cabinet is built with openings to provide easy observation of the work, the openings being protected by heavy glass and special screen. Electric lights with reflectors and protectors, furnish light. The operator directs the abrasive stream onto the work through a flexible sectional curtain of heavy cloth or rubber; this permits free access to every portion of the load being blasted. The table is omitted when machines are intended for heavy work, the loading being done through a door. However, there is a grating in the floor which may be revolved to permit the work to be blasted from different angles. The hopper for the discharged abrasive is under the table or grate floor, and at this point there sometimes is provided an underdraft which acts as a dust arrester for the cabinet. The reclaiming or separating involves the same principles already described. The cabinet blast of this type is adapted to work that is too large for the table blasting machines. Different manufacturers have various designs for this type of machine.

The cabinet type of machine is built in small sizes involving the suction or gravity principles. This small size is for light work. There usually are two or three stationary nozzles that cover the entire area of the cabinet floor. The abrasive is fed down to the nozzles by gravity and discharged by mixing with the air in the nozzle. The reclaiming and dust arresting devices are practically the same. This machine handles work that will not stand a high velocity of the abrasive. Special refinements, such as devices for turning the floor, etc., also appear.

The barrel blasting machine employs either the gravity or the direct pressure system. In the direct pressure system the blasting chamber consists of a barrel-shaped container of rigid construction in which is fastened another barrel, having approximately 2-inch smaller dimensions and made from perforated steel. This drum is supported by a heavy frame and set at an angle approximately 45 degrees or in a level horizontal position and caused to revolve around its axis thereby tumbling the work. However, the head of the barrel usually remains stationary. In this head the nozzle for discharging the abrasive is mounted as well as the suction connection for the exhausting of the dust, and a door for loading and unloading work. The discharged abrasive falls through the perforated metal into the solid drum from where it is discharged into a hopper or a container. The mixing tank, the elevator and the separator usually are beside the barrel. The same method of separation and dust arresting is used as previously described. The connection from the mixing tank to the nozzle is a flexible hose. When the abrasive from a barrel is discharged into a container it is necessary to transfer it to the elevator hopper by hand. The barrel is run at 5 to 10 revolutions per minute according to the weight and nature of the load. Barrel sandblasting is an economical system for cleaning pieces too small to be handled individually, and may be used for any pieces up to the limit of its holding capacity; the limit of small pieces being governed by the size of the holes in the inner barrel. There are many sizes and designs of sandblasting barrels on the market, which involve gravity, suction and direct pressure systems. Many designs of sandblasting barrels are loaded from a door in the side.

These descriptions cover in a general way the most common sandblasting machines. Among the devices and refinements of these machines are found automatic valves for shutting off the sand supply in pressure tanks, water and oil separators, and various devices for handling the abrasive, which are termed elevators in the foregoing descriptions, highly developed screens and riddles, various dust arrestors and many refinements and devices common only to a machine built by a certain manufacturer.

Determining Velocity

The velocity of the abrasive in any sandblasting machine, regardless of the method used, is determined by two factors; first, the pressure which the air itself is under, and secondly, the size of the opening in the nozzle or jet through which the abrasive is discharged. As the size of the opening in the nozzle increases, due to wear, the volume of air flow increases, pressure necessarily decreasing. Decreased pressure results in decreased velocity which means the slowing up of the operation. This is true with any abrasive. The higher air pressures produce the greatest cleaning power. The ratio is approximately 2 to 1; that is, twice as much work will be cleaned at 80 pounds pressure as at 40 pounds pressure, provided the openings in the nozzles are the same. To specify the best air pressure and size of nozzle for obtaining maximum efficiency is a problem governed by the type, size and design of the work being treated together with the kind of abrasive to be used. Cast iron castings of rigid construction are cleaned most efficiently and produce the best cleaned surface using sand with 90 pounds air pressure per square inch through a ⅜-inch opening in the nozzle. This is using the direct pressure system. Air compressed to 90 pounds per square inch and exhausted through a ⅜-inch nozzle is equal to 12,660 cubic feet of free air per hour. This amount of air at a rate of $0.06 per 1000 cubic feet for compressing

free air to 90 pounds equals $0.76 per hour per nozzle for actual running time. It readily will be seen that the item of compressed air is the largest cost in sandblasting, therefore, much care should be taken to see that machines are operating at maximum efficiency by using the correct air pressure and correct size nozzle, as no fixed pressure and nozzle opening may operate efficiently on all classes of work. The above figures are taken from practice in the Fort Wayne plant.

The abrasives used in modern sandblasting are of three kinds; namely, sand, steel grit and chilled shot, sand being the most extensively used. The sands used are of three kinds; these being bank, sea and flint sand. Bank sand, as the name implies, is taken from the banks of rivers, streams or from sand pits. The sand is graded by washing with water, drying and then putting it through a series of riddles. This sand contains granules of all sorts of shapes from flat and thin to spherical. It is softer than sea or flint sand and, therefore, wears out or disintegrates faster. Due to the irregularity in the shape together with different hardness of the granules, some of the grains are ineffective when discharged. The fast disintegration also causes more dust, the crystalline structures in this sand breaking up easily.

Secure Sea Sand

Sea sand is taken from the sea shores and beaches. It is washed, dried and then graded through a series of riddles. The grains of sea sand are more or less globular-shaped having some sharp edges. Sea sand is harder than bank sand and also more uniform.

Flint sand is manufactured by patented processes from hard rock, usually from flint rock, the grains being uniform and of a spherical shape. Being this shape more grains are allowed to pass through the nozzle at the same time and each grain receives approximately the same pressure. The sand also receives maximum velocity for the same reason; that is, there are less and smaller air spaces between the grains. Flint or artificial sand usually is harder than either bank or sea sand, the hardness of this sand depending upon the rock structure in the locality from which it was taken.

When using sand as an abrasive the cleaning is done by the grinding action of the individual grains on the surface, with little actual cutting action. This being the case a sand composed of round-edged grains is the best sand. To accomplish the best grinding action the nozzle should be set so that the sand strikes the work at an angle, although grinding action is obtained by hitting the work squarely.

Disintegrated sand has little grinding power although it may be used to some advantage to fill up the air spaces between the good grains, thus giving more velocity and greater grinding power to the good grains. If disintegrated sand is used for this purpose it should be watched carefully as too much of it will be detrimental by giving velocity to material that does not produce any work. Hard, sharp grains of sand such as we find in bank and sea sand produce cutting action but this soon gives way to grinding action after the edges are gone. The sand producing the longest wearing qualities and the highest velocity with a given amount of air is the most economical to use if the cost per ton is not unreasonably higher.

Steel grit is used extensively. This material is manufactured by crushing of chilled cast steel and each granule has numerous sharp angles and corners on it. This steel grit is graded and the different sizes numbered. Various manufacturers have different methods of casting, crushing and grading, also different formulas for the steel itself. Steel grit accomplishes its works by a cutting and burnishing action. After the sharp edges of the steel grit are gone a burnishing or peening action takes place.

The speed with which this material cleans is governed by the size, sharpness, velocity and the number of granules discharged. Due to its irregular shape there are more air spaces in the nozzle and a less number of granules. Steel grit, cleans by cutting; the larger sizes which hold their cutting edges longer produce the fastest cleaning. The large granules produce a rougher surface than the small ones and the correct size of steel grit to use should be governed by the nature of the work and the requirements.

Chilled shot is a material manufactured for use as an abrasive. It is made in small globular shapes by chilling small globules of high carbon steel in water. Different manufacturers have different methods for making chilled shot and different formulas for making the steel. Chilled shot accomplishes its purpose solely by a peening action. Shot blasting is best adapted to large work such as removing cores and sand from castings and also for removing foundry scale. Due to the globular shape of the particles, a maximum number are discharged and there are a minimum number of minimum sized air spaces, thereby affording maximum velocity. Cleaning by a peening or a burnishing action is a slower process than the grinding or cutting action. However, chilled shot wears longer than either sand or steel grift and produces little dust. This feature offsets the time element on large work.

Governs Work Time

The speed and thoroughness with which an abrasive cleans or works is governed by the velocity and the number of individual grains or granules striking the work rather than by the size of the grains or granules.

Metal abrasives are approximately three times as heavy as sand and more air pressure is required to obtain the desired velocity. The volume of the abrasive discharged is governed by the size of the opening in the nozzles. There is no one abrasive adapted to all work. It should be selected by careful investigation and test, keeping in mind the surface required on the work, the material itself that is to be treated, the cost of the compressed air to discharge the abrasive, the life of the abrasive itself, the speed with which it cleans, the amount of dust produced and the original cost per ton. Abrasives should be stored in absolutely dry places.

The nozzles of sandblasting equipment are the means through which the stream of abrasive is directed on the work. They usually are made of chilled cast iron or steel of various diameters and in lengths from 5 to 8 inches with the opening running lengthwise in the metal. This determines the amount of abrasive discharged and its velocity under a given air pressure; that is, the abrasive discharged from a ¾-inch opening will be at a higher velocity than the same abrasive discharged from a ½-inch opening using the same pressure, although the amount of abrasive discharged through the ½-inch nozzle will be greater. Nozzles are built with openings ranging from ⅛ to 1-inch. The wall around the opening usually is ⅜-inch to ½-inch thick, according to the size. The nozzles are constructed with shoulders or means for securing them to the supply lines. The high velocity of the abrasive passing through the nozzle causes it to wear out rapidly, thereby enlarging the opening and decreasing the velocity of the abrasive. The nozzles should be watched closely as it is costly to run badly worn nozzles. The

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Square Found Early Use

History Shows that Men of Ancient Egypt and Greece Used This Essential Instrument in Building Their Wonderful Structures

By Walter C. Ewalt

THE origin of the square, or its prototype, has been lost in that bottomless gulf of undiscovered antiquity. From time immemorial, the square has been one of the most wonderful tools invented, for ever since man has hewed logs or cut stone, some form of a square has been used.

It was formed by ancient craftsmen in two ways, either by two rules joined together at right angles or by a flat piece of board with a right angle cut out of it. Two kinds of squares, which were taken from ancient monuments are illustrated in Fig. 1. It is inconceivable to imagine that the wonderful architectural works of art erected by the Babylonians, Egyptians and Greeks, and also the beautiful temples and cathedrals of Western Europe, could be erected without the use of the square.

With this tool, the first laws of construction were determined which taught that the systematic laws of proportion led to the highest attainment. The original use of this instrument was to square the timber and stone, which made it much easier to construct buildings that would remain permanent and solid. As no mortar was used in ancient times, it was necessary to keep the stones in their proper places by gravity alone, and this led to the squaring of the material so correctly that it was difficult to detect the joints made by the workmen of those days.

If we examine the plans used by the Egyptians, it will be seen that the general outline of their temples was square or rectangular—for instance the temple of Ramesseum. In this style of architecture, many columns were made square. The Chaldeans and Assyrians used square timber and brick in the construction of their buildings. Likewise the plan of the temples built by the Greeks and also parts of the columns used

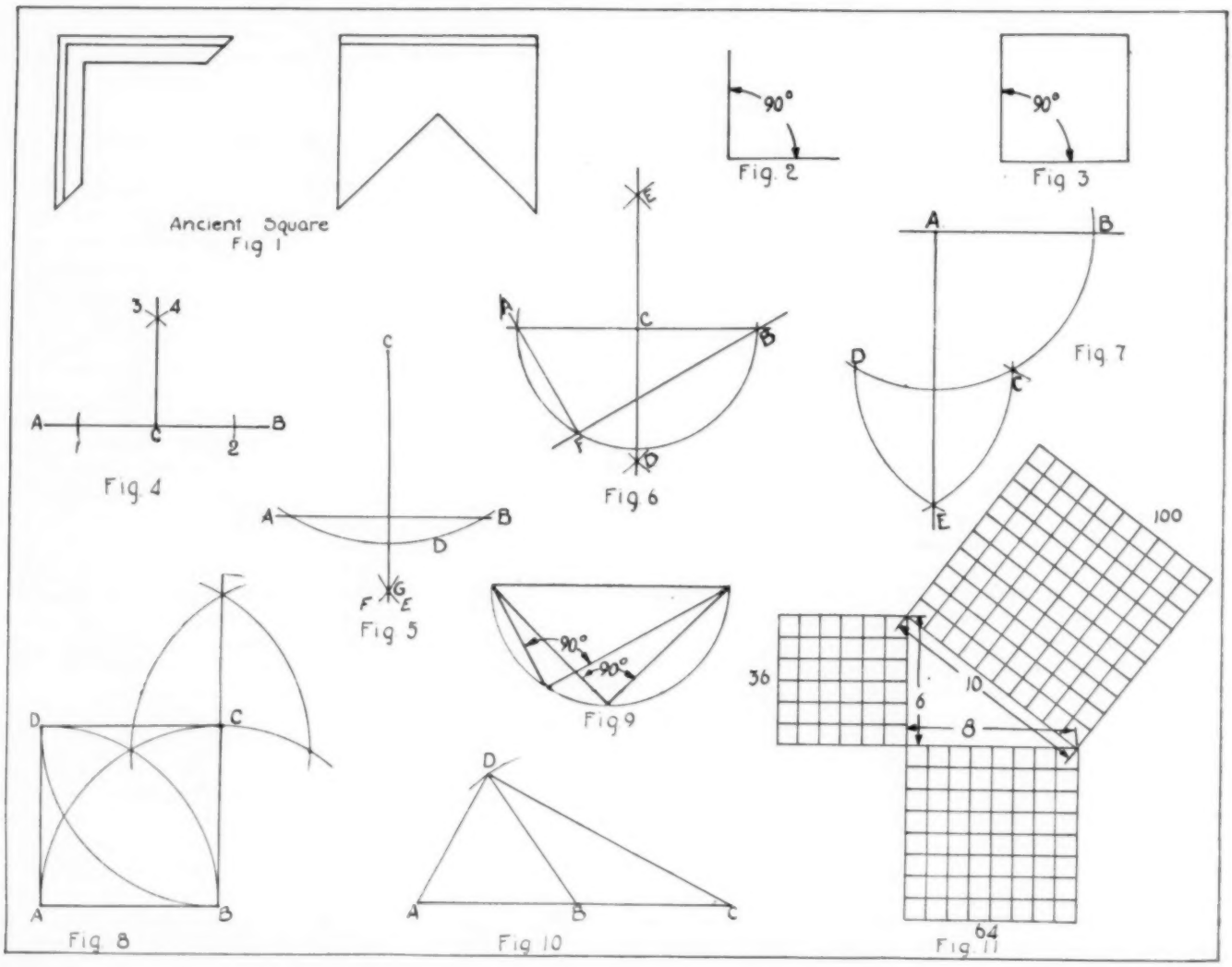


FIG. 1—TYPES OF ANCIENT SQUARES. FIG 2—THE RIGHT ANGLE HAS 90 DEGREES. FIG. 3—THE SQUARE FIGURE HAS EQUAL SIDES. FIGS. 4 TO 7—ERECTING PERPENDICULARS. FIG. 8—DRAWING A SQUARE. FIG. 9—A RIGHT ANGLE INSCRIBED IN A SEMICIRCLE. FIG. 10—OBTAINING A SQUARE. FIG. 11—THE FORTY-SEVENTH PROBLEM OF EUCLID

in supporting the roofs were square.

The pyramids and obelisks are square. With these examples of beauty and strength, is it any wonder that the square became a symbol of morality among men? When man emerged from that primeval home made in caves, in tree tops, in tents or bowers of foliage, and settled down in one spot to erect a permanent home to protect him from storms, heat and cold, his inventive mind created the square. It is true that something besides the square was used to embellish those marvelous master pieces but the beginning, the foundation of the construction of each was the implement which commonly is called the square.

"Ever since symmetry began and harmony displayed her charms," this instrument sprang into existence. Pliny states that Theodorus of Samos was the inventor of the square, but it is thought that many years before, the tool was used by far more ancient peoples. Sculptured figures in ancient Thebes depict the square and it probably was used many years before among the builders of the early cities of the plains of the Euphrates and Tigris.

The square was regarded in ancient times as the sign of completeness, and this applied to work, as well as man. The square is represented on Roman tombs.

The Japanese have iron squares marked with degrees. It is thus seen that for many ages and with many peoples, as soon as man advanced to that standard which led him to desire permanent dwelling places, he used this instrument to mark and try right angles. With the aid of the square he learned to reduce the wood and stone used in buildings, accurately to right angles and to straight lines.

When a line is perpendicular to another line, it is said to be square. The opening, or the angle between these lines is 90 degrees and is called a right angle as shown in Fig. 2. When considered as a quadrilateral, the square is a rectangle all of whose sides are equal, as in Fig. 3.

A perpendicular line may be drawn in various ways. One method is shown in Fig. 4. The line *AB* is drawn and near the center as at *C* and using *C* as a center, with any radius, arcs 1 and 2 are drawn cutting the line *AB*. With the points 1 and 2 as centers, the arcs 3 and 4 are drawn. A line drawn from the point of the intersection of 3 and 4 to point C will be perpendicular to the line *AB*.

Another method for drawing perpendicular lines is shown in Fig. 5. here a perpendicular to a line is drawn from a point outside and near the center of the line. *AB* is the given line and C is the point. With C as a center the arc *D* is drawn. Using *AB* as centers and with equal radii, the arcs *E* and *F* are drawn which intersect at *G*. The line then is drawn *GG* which is perpendicular to *AB*.

In Fig. 6 a perpendicular line is drawn from a point *A* outside and near the end of the given line *FB*. The line *A* is drawn and the point *C* is found by bisecting the line *AB*, using *AB* as centers and with equal radii describing the arc *D* and *E*. The line *DE* bisects the line *AB* at *C*. The semicircle *ABF* is drawn with *C* as a center. *AF* is then perpendicular to line *FB*.

In Fig. 7, the given point is at or near the end of a line, *AB* being the line and *A* the given point. Using *A* as a center, an arc is drawn intersecting the line at *B*. With *B* as a center and with the same radius the arc is cut as at *C*. Using the *C* as a center, with the same radius, the arc *D* is drawn cutting the arc *BC* at *D*. as center and with the same radius, the arc *CE* is drawn. A line drawn from *E* to *A* will be perpendicular to line *AB*.

A square may be drawn as in Fig. 8, *AB* being the given length of a side. The perpendicular *AB* is drawn as in Fig. 7. With *A* and *C* as centers and with the same radius, the arcs are drawn at *D*. Lines drawn from *C* to *D* and *A* to *D* complete the square.

From any point on the arc of a semicircle lines may be drawn to the ends of the diameter and the included angle will be square as in Fig. 9. The square may be obtained with a straight rule or even a straight stick of wood, as in Fig. 10. The line *AB* first is drawn to any length, then continued to *C* in a straight line *B* must bisect *AC*. The line *BD* is drawn equal in length to *AB* which also is equal to *BC*. *DC* is drawn, the line *DA* being perpendicular to *DC*.

We are indebted to Pythagoras for one of the most useful and extensively used discoveries, namely his demonstration of the forty-seventh proposition of Euclid. He found that in any right angled triangle that the square root of the sum of the squares of the base and altitude will give the length of the hypotenuse. This is shown in Fig. 11. The following is a list of a number of integral, whole number, right angle triangles which will be useful in drawing out squares:

Base	Height	Hypotenuse
4	3	5
8	6	10
12	5	13
12	9	15
15	8	17
16	12	20
20	15	25
24	7	25
24	10	26
32	24	40
35	12	37
36	15	39
40	9	41
48	14	50
60	11	61
84	13	85
112	15	113

How Can a Small Shop Stay in Business?

(*Concluded from Page* 720)

merely a profitable foundry industry, but a progressive one:

Adopt a standard accounting system throughout the local foundry district, so that there may be a uniform basis for comparison of production costs.

Forget the fetish that any shop can operate with no overhead; or that any proprietor can beat overhead.

Develop local trade associations, and each member abide faithfully for his own preservation, by all legitimate agreements, as to cost finding, estimating methods, trade ethics, etc.

Sell goods and services; not prices or discounts.

Consolidate into one corporation, not necessarily into one plant, the small single proprietors of a district, so that productive and commercial operations is economical.

To the purchasing agent of the big customer, I venture this: It is of doubtful advantage to the customer in the long run, to place an order with a vendor unless that vendor by filling the order will reap a distinct and considerable advantage. Under all ordinary conditions the particular advantage to the vendor should be the making of a reasonable profit.

Sandblasting Castings

(*Concluded from Page* 749)

abrasive, when entering the nozzle, should enter it straight and not from an angle nor should the abrasive enter so as to cause a whirling motion. Abrasives entering the nozzle as described above cause the nozzle to wear at the side and to cut through rapidly. The opening in a nozzle should wear evenly if the abrasive enters it properly. However, the bottom part of the nozzle will wear faster than the upper part where the abrasive enters. The average life of a nozzle, all abrasives and air pressures considered, is from 2½ to 4 hours. The minimum time for wearing out a nozzle is approximately 30 minutes while the maximum runs as high as 6 hours.

The Shakeout

DAN M. AVEY, Managing Editor
PAT DWYER, Engineering Editor
CHARLES VICKERS, Nonferrous Editor
FRANK G. STE NEBACH, Associate Editor

¶Make It Plain

DOUBT sometimes is expressed by the average man as to whether or not our great technical organizations in their desire to live up to their reputations as technical associations are not becoming too technical. The character of many of the papers presented and the limited discussion which follows at many of the conventions would seem to indicate that the subjects under consideration appeal only to a limited number. No person questions their value or the fact that abstruse scientific research and investigation are of the utmost value to industry. Necessarily the theories advocated or defended in these papers are couched in language that conveys little or no meaning to a person who does not have the background of a chemical or engineering education. For that reason much of the information is so much perfume wasted on the desert air.

THE average Foundrymen—and this with all due respect to men with sufficient skill and knowledge to operate their plants at a profit—are interested more in the present than in the future. They have neither the time nor the inclination to pursue vague theories to a solution. Life is real, life is earnest and they like to feel solid stepping stones under their feet while crossing the swamp where jack-o-lanterns and weird hob-goblins abound. For example the average foundryman does not care in what manner and to what extent iron picks up oxygen in the blast furnace, but he would like to know of some simple practical test by which he can reject a carload of unsuitable iron without going through the costly experiment of running off a heat that nets nothing but scrap. The foundryman wants technical information, but he does not want it too technical. Further he wants it presented in language within his comprehension.

¶Australia Broadcasting

STRANGELY retiscent and difficult to fathom is the public mind. If the candidate for public office, the actor, the minister or the manufacturer always could determine what is in the mind of HIS public he would be favored of fortune. With this thought in mind and for the good, sound common sense that it contains, the following extract from a most interesting letter received recently from Australia is presented. After some complimentary remarks concerning THE FOUNDRY, a note about how he binds the editorial material in one volume and the advertising separately, the writer says:

> MY ONE and great regret is the fact that none of your advertisers, with the exception of one, has any agencies or stocks in this vast country. I read of your wonderful core oils, molding machines, sand mixers, vibrators, etc., together with the hundred and one little accessories which go to make foundry life a little easier, but when I realize that I have to buy money orders, arrange shipping and all the rest of it and then take the chance that I will get what I expect, always from somewhat meager information given in the ad, it isn't worth the worry.
>
> No one in Australia stocks any foundry equipment—all we can buy here is blacking, coal dust, brick dust and core gum. That's the lot. So you see what one has to put up with. Now there's a virgin idea for you to work upon. It's no use having agents and no *stock*—samples and no bulk or a heap of literature and no prices. The —— people have an agent here, but no prices and the agent don't know a stripping plate machine from a bottom pour ladle. So go ahead and see if you can do anything. Australia could easily support a firm like ——— and do big business.
>
> Another thing—when one writes for a quotation or further particulars in a great many cases, the advertiser only answers half the questions, is unable to quote for some foolish reason, can't quote f.o.b. steamer, etc. until you get disgusted and finally design and make the machine yourself, not feeling inclined to wait another *three months* for a fresh reply.
>
> You can only write and get a reply to four letters a year from Australia.
>
> If at any time you want any information about Australia—just ask and I shall be pleased to do anything I can for you.
>
> Yours very truly,
> ARTHUR T. ALEXANDER, *Manager*,
> Australian Malleable Iron Co., Ltd., Port Adelaide, South Australia.

This probably represents the opinion, the unvoiced thought of many readers of THE FOUNDRY in the far corners of the World.

Trade Outlook in the Foundry Industry

SUMMER decline in business this year was far less pronounced than is usual. For this reason, while the recovery is less marked by way of contrast, the swing upward is discernible. Practically every factor contributing to better foundry business is present. Building contracts let have been large. Automobile builders continue to manufacture at a high rate and with the price war which ushered in the changing season, sales seem to have been stimulated. Agricultural outlook is splendid, in fact rural centers will be the dominating factor in fall business.

Pulling Upgrade

July showed a marked upward influence in many lines. Coal consumption figures prepared by the National Association of Purchasing agents showed an increase of 3 per cent, while production was intensified and stocks were increased in anticipation of the strike which has occurred. Automobile production for July established a new high record for that month and served to bring the first seven months of the year about 200,000 cars ahead of a like period last year. Price cutting, resorted to during the latter part of July, was apparent in August sales and probably will have some effect during the remainder of the year. With a capacity of more than a million cars in excess of the greatest total annual consumption, the age-old law of survival of the fittest doubtless will apply. Orders for automobile castings are going forward to foundries practically unimpeded, while the purchases of special iron, such as silveries and nickel alloy iron used by automobile cylinder shops indicate a faith in continued demand for this class of castings. One considerable factor in carrying along the demand for automobiles has been the better financial ability of farmers to buy automobiles both for service and pleasure use.

Prices for Raw Materials for Foundry Use

CORRECTED TO SEPTEMBER 8

Iron		Scrap	
No. 2 foundry, Valley	$18.50	Heavy melting steel, Valley	$18.00 to 18.25
No. 2 southern, Birmingham	18.00 to 18.50	Heavy melting steel, Pitts	19.00 to 19.50
No. 2 foundry, Chicago	20.50	Heavy melting steel, Chicago	17.00
No. 2 foundry, Philadelphia	21.76	Stove plate, Chicago	17.25 to 17.75
No. 2 foundry, Buffalo	19.00	No. 1 cast, Chicago	20.75 to 21.25
Basic, Valley	18.00 to 18.50	No. 1 cast, Philadelphia	17.50 to 18.25
Basic, Buffalo	18.50 to 19.00	No. 1 cast, Birmingham	16.00 to 16.50
Malleable, Chicago	20.50	No. 1 cast, Buffalo	17.00 to 17.50
Malleable, Buffalo	19.00	Car wheels, iron, Pittsburgh	17.00 to 17.50
		Car wheels, iron, Chicago	18.00 to 18.50
Coke		Railroad malleable, Chicago	19.50 to 20.00
Connellsville foundry, coke	$ 4.25 to 4.75	Agricultural, mal., Chicago	17.75 to 18.25
Wise County foundry, coke	4.50 to 5.25	Malleable, Buffalo	18.50 to 19.00

Demand Light

Demand for steel castings continues to be practically unchanged. The total bookings of commercial steel castings for July, according to the department of commerce were only 54.2 per cent of capacity, compared with 48.2 per cent for the preceding month. Similarly the orders for railway steel castings increased to only 46.4 per cent of capacity in July, compared with 38.3 per cent for June. Malleable castings also show the effect of limited railway demand. The total orders booked in July represented only 50.1 per cent of capacity in July, compared with 51.6 per cent during the preceding month, while production showed a similar drop, when statistics were compiled by the department of commerce covering 130 identical shops. Malleable castings orders have dropped steadily since April. With a normal improvement in railway buying both malleable and steel foundries would show a marked betterment.

Pig Iron Gains

August output of pig iron showed a gain, according to statistics compiled by the *Iron Trade Review*. The total production of all classes of pig iron amounted to 2,703,616 tons in August compared with 2,665,262 tons for the preceding month. On a daily average basis, this gives the month just past, 87,213 tons per day, against 86,976 tons for July, an increase of 1.4 per cent. Merchant iron, in which the foundryman is more directly interested showed a total of 585,161 tons in August, against 609,741 tons for the preceding month. This loss carries through on a computation of the daily average rate, which shows a production of 18,876 tons per day in August and 19,669 tons per day in July or a decline of about 2.5 per cent. A loss is shown in the total number of furnaces making merchant iron during the month of August. Jobbing foundry activities are improving steadily, while speciality shops, especially the pipe and sanitary ware foundries are exceptionally busy. The total orders for bath tubs received during July increased almost 10 per cent over the preceding month, according to the department of commerce. The total orders received for lavatories increased from 136,931 in June to 142,939 in July, while the miscellaneous small ware also showed a marked gain. Soil pipe orders, strangely, have declined in a similar period. Railway purchases still remain light, although the tremendous shipments of freight continue. Manufacturers expect ultimately to benefit by the excessively heavy loadings and the length of service which cars are undergoing before being placed in the bad order classification for major repairs.

Nonferrous Operations

Plumbing goods and automotive brass shops are active. New York prices for nonferrous metals, according to the *Daily Metal Trade* of Sept. 8 follow: Casting copper, 14.25c; electrolytic copper, 14.70c; Straits tin, 57.62½c to 57.75c; lead, 9.75c; antimony, 16.75c to 17.00c; nickel, 38.00c; No. 12 aluminum, remelt, 24.00c. Zinc is 7.67½c, E. St. Louis, Ill. Average monthly prices for August follow:

New York Prices

Castings Copper	Electrolytic Copper	Lead	Tin Straits	Antimony	Aluminum 98-99	Zinc St. Louis
14.071	14.759	9.87	57.178	17.589	27.00	7.115

Personal

ARTHUR J. TUSCANY, chosen for the fourth successive year to administer the duties of secretary-manager of the Ohio State Foundrymen's association, has had a varied administrative experience. Previous to his appointment in 1922, Mr. Tuscany was treasurer, director of purchases and a member of the board of directors of the Whitney Tractor Co., Cleveland. Prior to that time he was sales manager and a director of the Post Tractor Co. of that city which was consolidated with the Whitney firm. His early experience was gained with the Johns-Manville Co. organization, first as secretary to the branch manager and later as purchasing officer and salesman. He then was made field manager, a position he held for three years. Mr. Tuscany received his elementary education in Cleveland schools, later taking preparatory work and seven years intensive training in night schools along business and mechanical engineering lines. His work with the Ohio association has been directed largely toward inculcating better business and cost methods in foundries.

A. J. TUSCANY

C. P. Clampitt has been made sales manager of the Burdett Mfg. Co., 300 North St. John's court, Chicago, manufacturer of welding equipment. He succeeds W. R. Noxson, who resigned Sept. 1.

Walter Stallings Jr., formerly superintendent of Crown Pipe & Foundry Co., Jackson, Mich., will be superintendent of the new soil pipe foundry being erected at Gadsden, Ala. The foundry is being built by H. Wetter Mfg. Co., Memphis, Tenn.

To Study Production

Baron Carl von Gienanth, managing director of Gebruder Gienanth, Eisenberg, Germany, manufacturer of stoves, soil pipe and other iron castings, is making a tour of the eastern portion of the United States for the purpose of studying American methods of production. Baron Gienanth was in America 25 years ago on a similar mission. He stated that during the interval the foundry industry has made greater strides in America than in any other part of the world.

Visits Auto Shops

Otto Basson, technical director of the Maschinenbauanstalt Humboldt of Cologne, Germany, has concluded a month's tour of American industrial centers including New York, Cleveland, Detroit, Chicago, and Pittsburgh, for the purpose of examining American equipment.

Catalog Is Complete

Hill & Griffith Co., Cincinnati, has published a new catalog that combines the functions of describing foundry commodities and a handy reference book. All foundry equipment from a cupola to a foundry nail may be found within its pages. The catalog is well illustrated and contains 607 pages. Descriptions and other pertinent information are given about the materials handled and manufactured by the company.

Open District Office

The S. Obermayer Co., Chicago, has established a new warehouse and district offices at Jefferson and Thomas streets, Newark, N. J. Previously, the company leased warehouse facilities and maintained offices at 207 Market street. The new building is of reinforced concrete, and comprises 10,000 square feet of floor space. Harold E. Beckman is district manager in charge.

W. J. Briggs has resigned his position as manager of the foundry supply department for L. H. Butcher & Co., San Francisco, to organize W. J. Briggs Co., San Francisco, which will represent the International Molding Machine Co., Chicago, and will deal in foundry facings and general supplies.

Frederick Mesta Dies

Frederick E. Mesta, president of the Mesta Machine Co., West Homestead, Pa., died unexpectedly Aug. 31, aged 49 years. Mr. Mesta was born Aug. 4, 1876 in Bethel township, Allegheny county, Pa.

Following his graduation from high school at Leechburg, Pa., he became associated with the Leechburg Foundry & Machine Co., later entering the engineering department of this company. He then went on the road as selling representative of the Leechburg company, as well as having charge of outside erection work. In 1898, Mr. Mesta took charge of the construction of the present foundry and machine plant of the Mesta Machine Co., and was made general superintendent when the plant was placed in operation. In April 1912 he was elected director and vice president in charge of operations, and in May of this year, following the death of his brother, George, was elected president and general manager.

FREDERICK E. MESTA

The first fall meeting of the New England Foundrymen's association was held Sept. 9 at the Exchange club, Boston. Robert Crawford, president of the Atlas Foundry Co., Detroit, was the chief speaker of the evening and selected for his topic, "Needs of the Foundry Industry."

On the basis of an approximate production of 3,800,000 units for 1924, there probably will be used in the neighborhood of 3,272,000 tons of iron and steel in the manufacture of new cars and trucks.

Standard Sanitary Takes Over Coast Firm

The Pacific Sanitary Mfg. Co., a $3,000,000 plumbing wares manufacturing corporation of San Francisco, has been acquired by the Standard Mfg. Co. It was stated that factories of the Pacific Coast concern, one of the largest manufacturers of plumbing goods in the West, will come under direct supervision of the Pittsburgh offices of the purchasing corporation. A $5,000,000 plant recently was completed in Baltimore, and a large addition made at the Louisville plant last year. Extensive improvements have been made at the company's potteries at Tiffin, O., and Kokomo, Ind., and warehouses have been built at Boston and San Francisco. The Pittsburgh factories on the north side and at New Brighton, Pa., have been operated steadily. Theodore Ahrens is president of the company.

Impact and Slow Bend Tests Compared

Comparative impact and slow-bend tests were made by S. N. Petrenko, on some nonferrous alloys and steels to determine whether the slow-bend test may be used as a substitute for, or as a useful addition to, the impact test. The effect of the notch also was studied.

For brittle materials, the impact and slow-bend values are affected greatly by the radius of the notch but are little affected by the net thickness of the specimen. For tough materials the opposite is true. The slow-bend test gave results that are comparable with those of the impact test but are less responsive to variations than the impact. On nonferrous materials the values of the slow-bend tests are lower than the impact, and higher than the impact for steel. The slow-bend test was found less convenient than the impact in ordinary routine practice.

Description of the tests and the results obtained are published by the bureau of standards in technologic paper, No. 289.

Disproves Scarcity of Albany Sand

New York state geological survey recently made a study of the Hudson river valley to ascertain the area of the Albany molding sand deposits. They found, contrary to rumor, that the supply of sand still is plentiful, and the strong bonding qualities of the sand have not deteriorated. Numerous tests were carried out to determine the proper method of grading these sands. It was found that the bonding strength was not related to the fineness of the sand. Permeability always should be accompanied by the grade because the permeability for a coarse sand may not work successfully in a finer grade.

A complete description of the area and the sand distribution is published by the New York state museum. The bulletin is No. 263 and is entitled "Albany Molding Sands of the Hudson Valley."

American Railway Car institute, an organization of individuals interested in railway car manufacturing and repairing, succeeds the Railway Car Manufacturers association. By mutual agreement the new organization succeeds to the assets, liabilities, and to certain of the activities of the association. Communications should be addressed to 61 Broadway, New York. J. M. Hansen is president and W. C. Tabbert is secretary.

Obituary

Henry T. Gibbard, for many years an engineer for the Detroit branch of the American Car & Foundry company recently died in Detroit.

Edwin Smeeth, president of the Smeeth-Harwood Foundry Co., Chicago, died Aug. 29 at his home in Oak Park, Ill. He was 63 years old, and a widow and three sons survive.

Joseph M. Dutton, assistant financier of the confederation of Iron Molders' unions and an official of the International Molders' union of North America, died Aug. 27 at the age of 59.

Eugene De Witt Roberts, aged 47, president of the Puget Sound Iron and Steel Works, Tacoma, Wash., died at his home there on Aug. 11. For many years Mr. Roberts had been a leader in industrial activity as well as being prominent in civic work.

Robert Mitchell Burton, president of the American Laundry Machinery Co., died Aug. 10 at his summer home in Wiano, Mass. Mr. Burton was born in Cincinnati in 1864 and was educated at Harcourt Academy, Gambier, O., and St. Paul's school, Concord, N. H. He worked in a stove foundry for 10 years and later spent four years in a hotel kitchen outfitting business. He had been president of the American Laundry Machinery Co. since 1896. He also was a director of the Canadian Laundry Machinery Co.

W. Mayor has been appointed as representative of the Macleod Co., Cincinnati, with offices in Penton building, Cleveland.

Foundrymen and Exhibitors To Meet on Diamond

Hear Ye! Hear Ye! -- Base Ball Game -- Syracuse Convention
Americanational League

Foundrymen ..... vs. ..... **Exhibitors**

A Ball Game between A. F. A. foundrymen members and Exhibitors will be played at the State Fair Grounds, Thursday afternoon, October 8

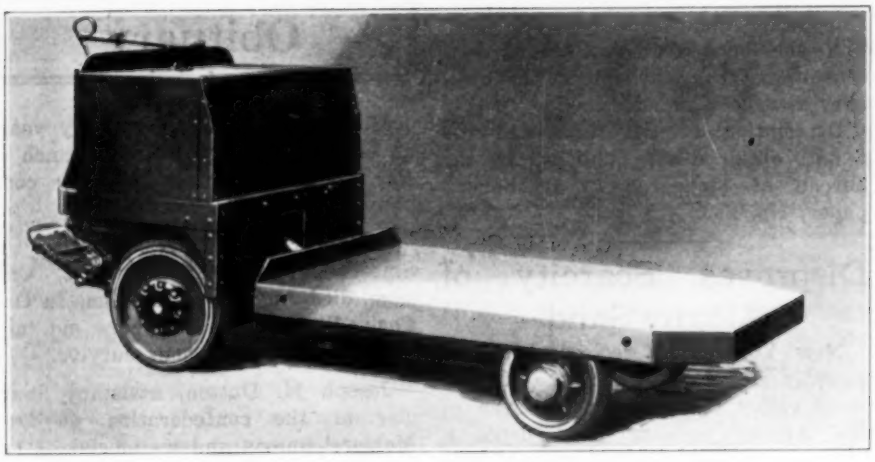
Manager Foundrymen's Team
S. H. JASPER
Penton Publishing Co
2149 Oliver Building
Pittsburgh, Pa.

Manager Exhibitor's Team
WALTER M. NANTKE
Dock & Mill Co.
136 Main Street
North Tonawanda, N. Y.

If you ever played base ball and have a desire to "show-your-stuff" in this game, send in your name and address to the Manager of the Team to which you are eligible, mentioning what position you wish to play

BASEBALL history for 1925 will not be complete after the Washington Senators and the Pittsburgh Pirates windup the final frame of the last game of the so-called World Series, for in Syracuse, N. Y., during the convention and exhibition of the American Foundrymen's association, or to be more exact on Thursday afternoon, Oct. 8, the Foundrymen's team piloted by S. H. Jasper, Penton Publishing Co., Pittsburgh, and the Exhibitors team, managed by Walter M. Nantke, Dock & Mill Co., North Tonawanda, N. Y., will cross bats in what promises to be a real exhibition of the national pastime.

Both managers, in a statement to a representative of THE FOUNDRY, *expressed a great desire to sign up immediately all available diamond material, and hope that those desiring to play will report by mail at once.*



THE GAGE OF BOTH FRONT AND REAR WHEELS IS WIDE

New Electric Truck Has Large Platform

The Elwell-Parker Electric Co., Cleveland, has developed a heavy-duty unit of the electric lift type, designed to travel on runways which are not smooth. The gage of both front and rear wheels is 30 inches. The truck is fitted with 22-inch drive wheels and 15-inch front wheels and with either 3½ or 4½-inch tread. Drive wheels are fitted with double-row, ball bearings and radial thrust bearings. Knuckles support the weight of the axle, frame and load on a steel, ball bearing recessed in a cup. All levers are placed high to avoid contact with any obstruction on the runways.

A feature claimed for the truck is the drop forged differential which carries a special phosphor bronze worm wheel, lock bolted between two halves of the differential cage. A new type of universal joint inside brake wheel connects the drive worm to the motor shaft. The platform is 40 inches wide and 72 inches long and is formed from a single steel plate. The platform is nose tapered to aid in inserting beneath a skid. The platform is 17 inches high when at the lowest position and 23½ inches high when raised. The battery compartment is set low at one end of the truck and has removable end doors to facilitate quick inspection and change of batteries. The controller is of a new design with reverse drum.

Straightens Core Wires

The straightener shown in the accompanying illustration was developed by Kane & Roach, Syracuse, N .Y., to salvage scrap core wires. The machine is manufactured in two types, motor drive or belt drive. The frame is mounted on legs and all gears and rolls are protected by cast-iron guards.

The feed guide is heat-treated and hardened. There are eight rolls, the first two acting as pinching rolls and the others are staggered. All but one upper roll are gear driven and the rolls are made of tool steel, heat-treated and hardened.

The manufacturers claim that the passes in the rolls are cut so that once the machine is adjusted, it will not have to be changed for different sized wires.

Iron Houses Approved by British Ministry

By John Horton

Cast iron houses promise to make a close fight with steel in Great Britain as an alternative for brick structures. The ministry of health has approved the scheme and the approval will secure a government subsidy.

The houses are to be constructed of a combination of concrete on heavy cast iron plates. The sections are joined together with flanges, and the division walls and chimney breasts are built of brick work bonded in cast iron shells. The internal walls to the ground floor rooms and bedrooms are formed of wood studding covered with asbestos cement sheets and the roof is tiled. These houses will consist of seven rooms and will cost approximately $2200 each, delivered and erected in quantities of not less than six.

Cast iron shells only, with windows and doors are quoted at approximately $750, delivered and erected. The advantage of cast iron construction lies in the rapidity of erection; a specimen pair being built in thirty working hours in Sheffield.

Safety Congress To Meet

The National Safety council will hold its fourteenth annual safety meet at Cleveland from Sept. 28 to Oct. 2. There will be 87 sessions and 450 addresses. Each session will cover some particular industrial field so that those attending the meeting will find something pertinent to their own particular line. Educational programs and safety devices for accident prevention will be discussed at the congress. The meeting will be open to the public.

THE STRAIGHTENER SALVAGES SCRAP CORE WIRES

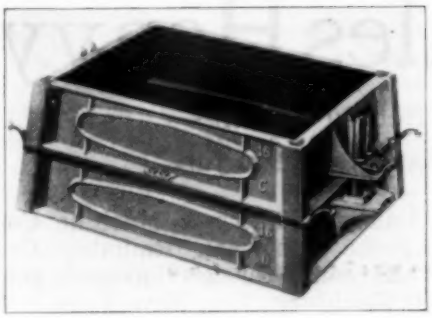


FIG. 1—ACCURATE JOINT IS CLAIMED FOR FLASK

Develop New Flask

Hines Mfg. Co., formerly Hines Pattern & Mfg. Co., Cleveland, has developed the new, light-weight taper flask shown in Fig. 1. This is made of an aluminum alloy and each section is constructed in four pieces. These pieces are joined together by corner fasteners which are designed to give accuracy in taper between the cope and drag.

Another feature is the use of adjustable, double pins which are designed to prevent shifts and to insure a smooth accurate draw. These pins can be removed by unscrewing nuts which hold the pin to the lug when worn and new ones, made from cold-rolled steel, inserted. The half bushings against which the pins slide also are adjustable and are moved to take up any wear. The movable sand support strips shown in Fig. 2 have no springs to rust or get out of adjustment and are arranged so that the maximum mold area is obtained.

The flasks, due to the metals used and the design, are said to be non-warping, weather-proof and rust-proof. Various sizes and heights of flasks will be manufactured to meet the users' requirements.

The company also manufacturers cast iron slip jackets which are bored to reduce the weight and which are designed to fit the molds made by the taper flasks.

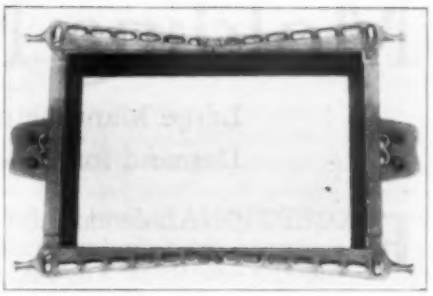
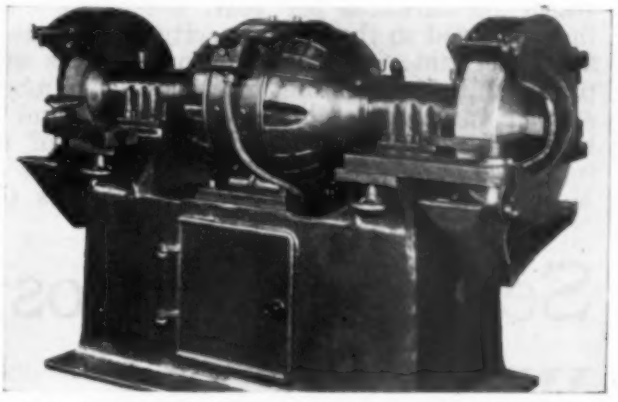


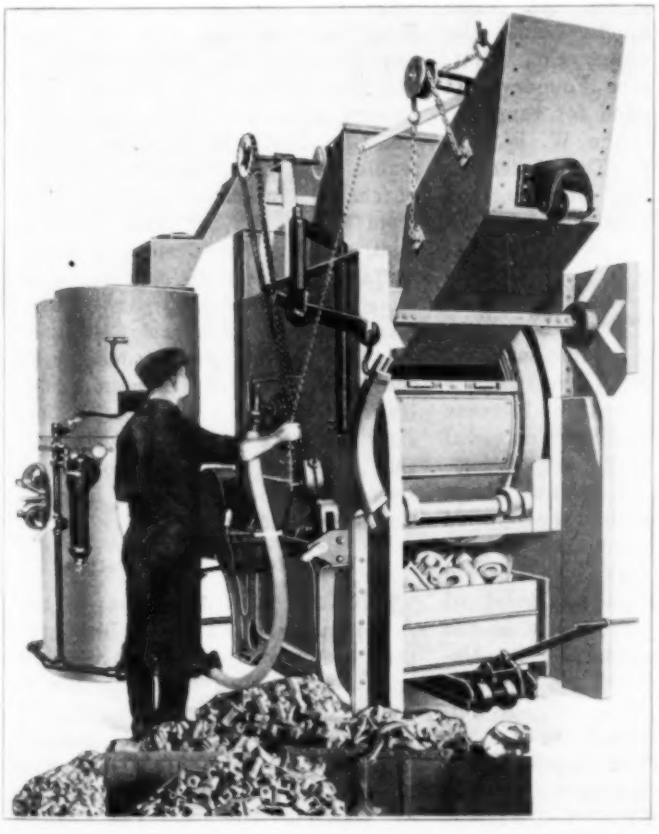
FIG. 2—NO SPRINGS ON SAND SUPPORT STRIPS

Charges Barrel Quickly

Decreasing the time loss in charging and discharging a sandblast barrel is claimed for the equipment shown in the accompanying illustration. This machine is manufactured by Pangborn Corp., Hagerstown, Md. A steel skip which is raised and lowered by trolley or crane is employed for charging the sandblast barrel. The clearance beneath the barrel is sufficient to accommodate a receptacle large enough to contain the whole barrel charge, which is dropped through the same door used to receive the charge. The barrel is the direct pressure type with two mixing chambers having individual lines to the nozzles. The mixing chambers are heavy castings with large openings to provide ample flow of abrasive material. The nozzles are the ball and socket type, and are removable. All operating parts are on the outside of the frame and access to the interior is obtained through a choke relief opening. The barrel drum is steel tired and runs on manganese steel rollers. The tank has a capacity of 5,000 pounds of sand or 12,500 pounds of steel abrasive. A completely enclosed gear reduction drive is made integral with the barrel to accommodate either direct motor or belt drive.



MOTOR SPEED CONTROL IS LINKED TO THE WHEEL GUARD



SKIP SPEEDS UP LOADING OF SANDBLAST BARREL

Grinder Has Constant Peripheral Speed

The United States Electrical Tool Co., Cincinnati, has designed a horizontal, double-end type grinding machine, a feature of which is the method of obtaining constant peripheral speed of the grinding wheel. The operation of the device is automatic, the motor control being linked to the wheel guard. As the guard is moved in to gain access to the face of the wheel, the speed of the motor is increased automatically. This speed change is accomplished by increasing or decreasing the resistance in the motor circuit as the wheel guard is moved. The driving motor is totally enclosed and is equipped with push button control with the button mounted on the front of the motor frame. The wheel guards are the hinged door type to provide wheel accessibility. The spindle is made of one piece.

T. B. Fordham, president, Ohio federation of Foremen's clubs is calling a meeting at Dayton, O., Oct. 8. Delegates from various clubs will organize a national association.

Molding Machine Sales Heavy

Large Manufacturing Interests in the East Have Record Months—Demand for Other Lines of Equipment Increase—Exports Fall in July

EXCEPTIONAL demand for molding machines featured the foundry equipment market during the month of August, although increased buying was realized in many other lines of equipment. The Osborn Mfg. Co., Cleveland and the Herman Pneumatic Machine Co., Zelienople, Pa., realized the largest monthly business in the history of their respective companies, the sales of equipment by the former company for August being well in excess of $250,000.

The A. & J. Mfg. Co., Gadsden, Ala., which soon will build a large foundry, has ordered equipment from the Osborn company for making 10,000 warm air furnaces per year, the equipment being arranged so that the capacity may be doubled at a later time. The installation includes several pairs of large molding machines, a number of smaller molding machines, flask fillers and sand handling equipment. Other large sales of molding machines by that company include the Ford Motor Co., Detroit; the Frank Foundries Corp., Moline, Ill.; the Lakey Foundry & Machine Co., Muskegon, Mich.; the American Radiator Co., Bayonne, N. J., and some foreign business sold through the Allied Machinery Co., New York.

The Bethlehem Steel Co., Bethlehem, Pa., has ordered a second complete unit of sand treating and handling equipment from the Osborn Mfg. Co., which will be used in the ingot mold foundry. That manufacturer also has sold a special installation to the Packard Motor Car Co., Detroit, which consists of a group of units which treats and handles the sand from shakeout to flask and handles and conveys flasks and finished castings.

Exports of foundry and molding equipment showed another decrease in July, the value of exports being $39,010 as compared with $49,863 in June. A decrease also was noted over July, 1924 when the value was $49,099. The exports for seven months ended July was $393,213 as compared with $269,341 for the corresponding period a year ago.

September Prospects Appear Bright

WITH some manufacturers of foundry equipment in the Chicago district August sales were almost double those of August, 1924. In most cases sales were bunched at the beginning of the month. Foundries on automotive and implement work are the best buyers of equipment. A heavy demand for molding machines was reported during the month of August. The Columbia Steel Corp., Torrance, Calif.; the Axelson Machine Co., Los Angeles, Calif.; the Commercial Iron Works, Los Angeles, Calif.; the Lakey Foundry & Machine Co., Muskegon, Mich.; the Los Angeles Foundry Co., Los Angeles, Calif.; the American Wood Rim Co., Onaway, Mich.; the Chicago Hardware Co., North Chicago, Ill.; the Kalamazoo Malleable Iron Co., Kalamazoo, Mich.; the Berryhill Malleable Iron Co., Evansville, Ind.; the Frank Foundries Corp., Moline, Ill.; and the Rockford Malleable Iron Co., Rockford, Ill., have ordered molding machines from the Osborn Mfg. Co., Cleveland. The Weil-McLain Co., Michigan City, Ind., has taken two machines, the Commonwealth Steel Co., St. Louis, Mo., and the National Brake & Electric Co., Milwaukee, each have purchased one machine from the Herman Pneumatic Machine Co., Zelienople, Pa. The Kay Brunner Steel Casting Co., Los Angeles, Calif., and the Chicago Steel Foundry Co., Chicago have ordered sandblast equipment from the Pangborn Corp., Hagerstown, Md. The Liberty Foundry Co., St. Louis; the Flint Malleable Castings Co., Flint, Mich.; and the Western Foundry Co., Chicago, have contracted for tumbling mill equipment from the W. W. Sly Mfg. Co., Cleveland. The American Building Foundry Co., Chicago, has closed on a sand mixing machine with the Standard Sand & Machine Co., Cleveland.

Cleveland Sales Heavy

SALES of foundry equipment during August in the Cleveland territory showed considerable increase over July, and in many cases exceeded expectations. The first part of September has started off in fine shape with every indication that the upward trend of sales will continue. Inquiries are being brought out in good numbers. The outstanding point of the market during the month is the heavy business transacted by the Osborn Mfg. Co., Cleveland, the sales exceeding a quarter of a million dollars. Molding machines have been sold to the Campbell-Hausfeld Co., Harrison, O.; the Dunham Co., Berea, O.; the Babcock & Wilcox Co., Barberton, O.; M. Hertenstein Co., Columbus, O.; the Electric Auto Lite Co., Fostoria, O.; the Packard Motor Car Co., Detroit; the Westinghouse Electric & Mfg. Co., Cleveland; the A. & J. Mfg. Co., Gadsden, Ala.; the American Foundry Co., Indianapolis; and the Ford Motor Co., Detroit, by the Osborn company. The Grabler Mfg. Co., Cleveland, and the Columbus Malleable Iron Co., Columbus, O., have purchased tumbling mill equipment from the W. W. Sly Mfg. Co., Cleveland, and the American Radiator Co., Buffalo, has secured continuous tumbling mill equipment from the same manufacturer. Johnson Piston Ring Co., Detroit, has secured dust arrester equipment from the Pangborn Corp., Hagerstown, Md. A special small sand machine has been ordered by the American Radiator Co., Detroit, from the Standard Sand & Equipment Co., Cleveland.

Pittsburgh Sales Better

AUGUST proved to be a better foundry equipment selling month than many of the dealers anticipated and if the month of September continues to develop orders at the same rate as during the first few days, sellers of equipment state they will imagine themselves back in the days of wartime buying. The Herman

Pneumatic Machine Co., Zelienople, Pa., sold more molding machines in August than perhaps in any other similar period of its history and possibly 250 molding machines are involved in orders now pending, several of which call for medium sized and large groups of machines. The Eagan-Johnston Steel Co., Crum Lynn, Pa., recently ordered five units, from the Herman company, the Thatcher Co., Garwood, N. J., bought three; the Florence Pipe Foundry & Machine Co., Florence, N. J., the Chapman Valve Mfg. Co., Indian Orchard, Mass., each bought one. Companies purchasing molding machines from the Osborn Mfg. Co., Cleveland, include the Vulcan Mold & Iron Co., Latrobe, Pa., the Bethlehem Steel Co., Bethlehem, Pa., the Berks Foundry & Mfg. Co., Berks, Pa., and the Carlisle Foundry Co., Carlisle, Pa. The Gray Iron Foundry Co., Reading, Pa., and the Westinghouse Air Brake Co., Wilmerding, Pa., have purchased sandblast equipment from the Pangborn Corp., Hagerstown, Md. An order for core ovens involving several hundred dollars has been placed by the James H. Beans Foundry Co., Martins Ferry, O. Shipment of two sand mixers is being made to the United States Cast Iron Pipe & Foundry Co., Scottdale, Pa., and delivery of a tumbling mill is being made to the Reliance Steel Casting Co., Pittsburgh. Bids closed Aug. 31 on two cupolas and two blowers by the Iron City Sanitary Mfg. Co., Zelienople, Pa., and early action is expected. The crane market has been fairly active of late from a foundry standpoint. The Youngstown Foundry & Machine Co., Youngstown, O., are understood to have ordered several cranes from the Shaw Electric Crane Co., Muskegon, Mich., and the Iron City Sanitary Mfg. Co., Zelienople, Pa., is understood to have placed its order for several with an Alliance, O. crane builder. The Ajax Iron Works, Corry, Pa., is in the market for a crane and runway.

New England Demand Better

DEMAND for foundry equipment in New England has shown favorable improvement during the last week or ten days. Nearly all equipment dealers report a marked increase in inquiry but actual sales are somewhat behind expectations. Sales of a number of molding machines are reported and several sand machines have been placed during the past week. The Plainville Casting Co., Plainville, Conn., the Nashua Co-Operative Iron Foundry Co., Nashua, N. H., and the Manufacturers Foundry Co., Waterbury, Conn., have ordered molding machines from the Osborn Mfg. Co., Cleveland. The Framingham Foundries Inc., Framingham, Mass., has purchased a sand machine from the Royer Foundry & Machine Co., Wilkes-Barre, Pa., the H. & B. Machine Co., Pawtucket, R. I, and the Kellogg Mfg. Co. Jersey City, N. J., also have taken a machine from the same firm.

Eastern Buying Lags

WHILE sentiment in the eastern foundry equipment market has improved within the past fortnight, actual buying continues to lag. New construction still is restricted and operations generally have shown little change. That some improvement is contemplated, however, is indicated by increased sales of equipment repair parts and supplies. One seller asserts that snap flasks are moving more actively than in several weeks. Another, pointing to a slight improvement in equipment, states that sand cutters are at present moving fairly briskly. Several sales of molding machines are reported in this territory, the Osborn Mfg. Co., Cleveland, having sold machines to the American Radiator Co., Bayonne, N. J., the Walsbach Co., Gloucester City, N. J., and the Allied Machinery Co. of America, New York. The Westinghouse Electric & Mfg. Co., Newark, N. J., has purchased sandblast and dust arrester equipment and the Thomas & Betts Co., Elizabeth, N. J., has secured sand blast equipment from the Pangborn Corp., Hagerstown, Md. The American Laundry Machine Co., Rochester, N. Y., has purchased a sand-mixing machine from the National Engineering Co. Chicago Included in building construction is a shop for the Dodge Steel Co., State road, Philadelphia, and a foundry addition for the Bridgeport Casting Co., Bridgeport, Conn., the equipment for which is likely to be inquired for shortly. The Adirondack Steel Foundries Corp., Watervliet, N. Y., is making some improvements and has recently purchased a 10-ton electric overhead crane, the contract reported as going to the Shaw Electric Crane Co., Muskegon, Mich. Plans are being prepared by the M. E. Wilfong Iron Works, Fifty-second and Gray street, Philadelphia, for a foundry building, to replace one badly damaged by fire.

What the Foundries Are Doing

Activities of the Gray Iron, Malleable, Steel and Brass Shops

Birmingham Electric Co., Birmingham, Ala., will build a shop and foundry in Fourth alley, one story, to cost $14,000.

Eastern Malleable Iron Works, Naugatuck, Conn., will install a new furnace to replace one of its former units.

Dodge Steel Co., State road, Philadelphia, is having plans made for a 1-story steel and iron shop.

Superior Steel Castings Co., Detroit, will shortly begin erection of a 2-story addition 50x85 feet to be used as a foundry.

Hance Mfg. Co., Westerville, O., has given a contract to the Austin Co. for a foundry 30x100 feet.

West Michigan Steel Foundry, Muskegon, Mich., is inquiring for a 2-stage air compressor, 500 cubic feet or more capacity and a 72-inch disk grinder with blower.

The Lenox Furnace Co., Eastwood, Pa., contemplates the erection of a foundry and office building.

Ajax Iron Works, Corry, Pa., is asking prices on an electric traveling crane and runway.

Bridgeport Castings Co., North Street, Bridgeport, Conn., is having plans made for a 1-story addition.

Kewanee Boiler Co., Kewanee, Ill., G. Dixon manager, will build an office addition two stories, 50x60 feet.

Advance Rumely Co., Battle Creek, Mich., manufacturer of agricultural machinery, headquarters at LaPorte, Ind., is building a 1-story addition to its plant. S. B. Cole has the general contract.

Standard Sanitary Mfg. Co., Pittsburgh, will build a branch plant at Memphis, Tenn., to care for distribution in the South.

Latrobe Electric Steel Co., Latrobe, Pa., will build a 1-story addition 60x400 feet, for which an electric traveling crane is required.

Southern Engine & Boiler Works, Jackson, Tenn., has been reorganized with Howard W. Dow, president, Jamestown, N. Y., and will make additions to its plant.

Fox River Pattern Works, 104 South River street, Aurora, Ill., has been incorporated with $5000 capital to manufacture models, patterns, cabinets and woodenware by Hart-

wig B. Johnson, Park Marsh, and George M. Riley. John M. Raymond is correspondent.

C. L. Capps Co., 1224 East Adams street, Jacksonville, Fla., is having plans made for a plant, including a brass and gray iron foundry department. (Noted Aug. 15).

Youngstown Foundry & Machine Co., Youngstown, O., is building a foundry. B. G. Parker is buying equipment

American Seeding Machine Co., Springfield, O., has bought the plant of the Thomas Mfg. Co., 70x90 feet, which will be utilized as an extension of its forge plant.

Vernon Brass Foundry, 5204 Malabar St., Los Angeles, Calif., opened recently by P. J. Olsen and H. Croman will manufacture brass and aluminum castings.

C. J. Clifford Metal Pattern Shop, Los Angeles, Calif., started recently by C. J. Clifford will manufacture brass, iron and aluminum castings as well as metal patterns.

Cochrane & Co., Woodside Iron Works, Dudley, England, is reopening after an idle period of eight months. The company manufactures cast iron pipe.

Alamo Iron Works Inc., 130 Santa Clara street, San Antonio, Tex., will build a 1-story foundry to cost $21,000, including equipment. (Noted May 1).

General Motors Corp., Saginaw, Mich., has begun an expansion program in its malleable iron plant here, which will double its capacity.

Casey-Hedges Co., Chattanooga, Tenn., T. H. Johnson general manager, Vulcan street, has started construction of an addition to its range boiler plant.

General Foundry Co., Anniston, Ala., has been incorporated with $15,000 capital to build and operate a gray iron foundry by J. C. Broadnax president, and E. W. Ledbetter secretary.

Baker Car Co., Harriman, Tenn., has bought the plant of the William J. Oliver Mfg. Co., Dale avenue, Knoxville, Tenn., and will equip it to manufacture mining machinery and cars.

International Motors Co., Jersey avenue, New Brunswick, N. J. has let contract to Stone & Webster Inc., 147 Milk street, Boston, for the second unit of its plant, two stories, 67 by 276 feet.

Vacuum Castings Co., Toledo, O., has been incorporated with $500 capital by August Kadow, George E. Wise, Thomas H. Walbridge, Elon D. Gauntlett and U. C. Denman.

Vulcan Mold & Foundry Co., Latrobe, Pa., is making improvements in the plant of the Peerless foundry it recently bought, by installing an electric furnace and other equipment.

Crane Co., Chicago, is having plans made for a 2-story, 160x120 foot plant and distributing works in Brooklyn, N. Y. Cost estimated at $80,000. Raymond Hood, 18 east 41st St. is architect.

F. E. Myers & Bro. Co., Ashland, O., manufacturer of pumps, will build a 5-story plant for a brass foundry and manufacturing departments. Lockwood, Greene & Co. are engineers.

Millard F. Wilfong Iron Works Co., Fifty-second street and Grays Ferry avenue, Philadelphia, will rebuild its burned foundry, taking bids on the general contract soon. J. R. Wilfong is president.

Symons Bros. Co., Indianapolis, Ind., is having plans made by Lamboy Co., 3005 Plankinton building, for a 1-story foundry and milling plant, 150x860 feet and 60x100 feet.

Kansas City Malleable Iron & Steel Castings Co., Kansas City, Mo., is the name covering a consolidation of the Kansas City Malleable Iron Co. and the Fairfax Iron & Steel Co. The plants will be enlarged.

F. N. DuBois Co., New York, manufacturer of plumbing supplies, will build two additions, 90x160 feet and 50x100 feet, at its plant at Newark, N. J. The Austin Co., 120 Broadway, New York, is engineer.

The Harrison Stove Co. Ltd., Harrison, Ont., will build a 3-story, brick and cement addition to its plant here to cost $10,000 at the corner of William and Marget streets, opposite the present plant.

Ohio Brass Co., Mansfield, O., C. K. King general manager, has let a contract to Jacob Wolfe Co., West Fourth street, for a 2-story addition 55x55 feet. Its product is electric railway equipment. (Noted July 1).

The E. W. Bliss Co., Brooklyn, N. Y., has sold its 115x200-foot foundry on Plymouth street, between J and Bridge streets, to the Brillo Mfg. Co., manufacturers of aluminum cleansers and steel wool, who will make the necessary alterations for it production.

Universal Motor Equipment Co., 26 Somme street, Newark, N. J., recently was incorporated with $100,000 capital to manufacture radiator caps, brakeshoes, automotive equipment and will do die casting and general machine work.

Bridgeport Brass Co. Bridgeport, Conn., has bought the plant and business of the Keating Valve Co., 32 Taylor street, Hartford, Conn., and will operate it as part of its own organization. The works may be removed later to Bridgeport.

Kohler Co., Kohler, Wis., manufacturer of sanitary ware, has bought the plant of the Cochran-Drugan Co. at Hutchinsons Mills, N. J. and will establish a branch plant there. The plant will be enlarged and equipment increased.

Federal Brass Foundry, Belleville, N. J., has been incorporated with $100,000 in preferred stock and 250 shares common no par value by Peter P. Neilsen, William J. Brown, of Belleville and Gustave Stadeler of Newark. John B. Brown, Newark, is attorney.

Lakeside Malleable Casting Co., Clark and Twenty-third streets, Racine, Wis., M. H. Olborn secretary, is building a pattern shop and shipping room, one story, 85x300 feet. Nelson & Co., 408 Robinson building, Milwaukee, has general contract.

DeMattia Foundry & Machine Co., Clifton, N. J., has placed a contract for an 80-foot extension to its foundry. This will give the company a modern building 70x240 feet with 2 cupolas and an approximate daily capacity of 20 tons of gray iron and semi-steel castings.

Southern Brass Mfg. & Plating Co., Houston, Tex., is completing a $25,000 building at 6614 Harrisburg boulevard as an addition to its main plant. The building is 75x140 feet and of concrete construction. Thomas C. White is president and J. L. Goodman was contractor.

Wridell Nobach Co., 12 South Clinton street, Chicago, has been incorporated to manufacture wood and metal patterns and do general machine work by W. J. Nobach, J. T. Hume, E. A. Nobach and F. O. Wridell. William E. Williams, 332 South LaSalle street, is correspondent.

Holmes Bronze Foundry Co., Bedford, O. has let a contract to the H. K. Ferguson Co., Cleveland, for an addition 130 feet long at its plant, to be completed in 30 days.

Wheatley Bros. Brass Works, Tulsa, Okla., will establish a branch plant for manufacture of brass fittings and castings on a site recently acquired at 19 North Owasso street.

The iron foundry of the Vulcan Iron Works, Wilkes Barre, Pa., recently was damaged by fire with a loss of approximately $75,000. No decision has been announced as to the rebuilding of this structure. The patterns were saved and work going through the shop prior to the fire will be continued at two other foundries owned by the company.

Crane Enamelware Co., 1316 Chestnut street, Chattanooga, Tenn., has let contracts to Moudy & Co. for four additional buildings, an enamel mill 180 x 225 feet, foundry 100 x 330 feet, grinding building 60 x 300 feet and an addition to double the smallware foundry. Equipment for the additions will be bought. (Noted Aug. 15).

New Trade Publications

TESTING MACHINES—Steel City Testing Laboratory, Detroit, has issued a bulletin describing its power operated hydraulic brinell testing machines, with halftone illustrations and complete data.

LABORATORY APPARATUS—Palo Co., New York, has issued a pamphlet describing equipment for the laboratory. Filter paper, balances, burners, furnaces, and microscopes are among the apparatus described.

ELECTRIC HOISTS—Uses of electric hoists, monorail type, about the shop in speeding up production are given in a folder published by Roeper Crane & Hoist Works, Inc., Reading, Pa.

JOLT SQUEEZERS—The Adams Co., Dubuque, Iowa, is sending out a 4-page supplement showing their 10-32 jolt squeezer. A description of the machine is given and its advantages enumerated.

SHOVELS—Many types of shovels are shown in the current catalog of the Pittsburgh Shovel Co., Pittsburgh. All sizes and shapes are equipped with various handles. These shovels are intended for many specialized uses, all of which are described.

VENTILATION—Use of disk fans to remove odors, gases or impure air from rooms without installing pipes or ducts is described in a bulletin by American Blower Co., Detroit. Other fans for industrial purposes are described.

SCALES—Scales with dials which may be read accurately and quickly from a distance are illustrated in a bulletin by the American Kron Scale Co., New York. The variety of uses to which these scales may be put is shown by halftone illustrations.

ELEVATORS—Portable and sationary elevators are described in a 40-page catalog issued by New Jersey Foundry & Machine Co., New York. The catalog is well illustrated showing various applications of elevators about the plant or shop, and gives the different types and their capacities.

BLAST METER—A booklet describing the blast meter manufactured by Charles J. Clark Blast Meter Co., Gladbrook, Iowa, is being sent to inquirers. It goes into the consideration of volume and pressure and how they are indicated by the use of this device on the cupola or air furnace.

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WITH a universal reputation in all America for cordiality, Syracuse, during the week of Oct. 5, promises to demonstrate the faith in which it holds the title that heads this page. This, in fact, is the slogan of the city selected by the American Foundrymen's association for its 1925 convention. Instead of blazoning to the world its merits, its hopes, or its proud boasts, this thriving industrial metropolis of northern New York says in simple friendliness: **"Syracuse Bids You Welcome."**

SUCH warmth of hospitality expressed in a city's motto, cannot fail to kindle in the hearts of its guests a reciprocal glow of friendliness. To those so fortunate as to attend the twenty-ninth annual convention and exhibition of the A. F. A. in Syracuse this month, a cordial reception is promised on the part of the city. The local committees, comprising representatives from the foundry, manufacturing, commercial and industrial establishments of the city and indeed of the entire northern New York section have been preparing for entertainment.

AT THIS season of the year, the country surrounding the convention city offers many attractions. The Mohawk and the Cherry Valley highways, Finger Lakes, Watkins Glen, Skaneateles lake, Cazenovia lake and many other regions of rare beauty are familiar to thousands of motorists who have toured this section of New York. The entertainment program planned for the pleasure of the ladies who will be present includes motor coach trips to a number of these points of scenic wonder.

In selecting this city for the 1925 convention and exhibition, the committee of the American Foundrymen's association was impressed by the opportunities offered through its location, excellent transportation facilities from the many great foundry centers of both the East and West, and by the admirable layout of the buildings at the state fair grounds where the sessions and exhibits will converge. In the space available for exhibition purposes, the number and variety of new devices, equipment and supplies, this year's show promises to surpass all previous exhibitions, except perhaps that of 1920.

PARTICULAR care has been exercised in preparing the technical programs and discussions arranged for the convention sessions. Divided according to the subject matter at hand, the papers and addresses have been scheduled so that overlapping will be prevented. The visiting foundryman is assured that he can schedule his time so that he has ample opportunity to engage in study of the technical problems most closely allied with his interests. Joint meetings with the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers, will bring together the best of technical and practical talent in the nonferrous field.